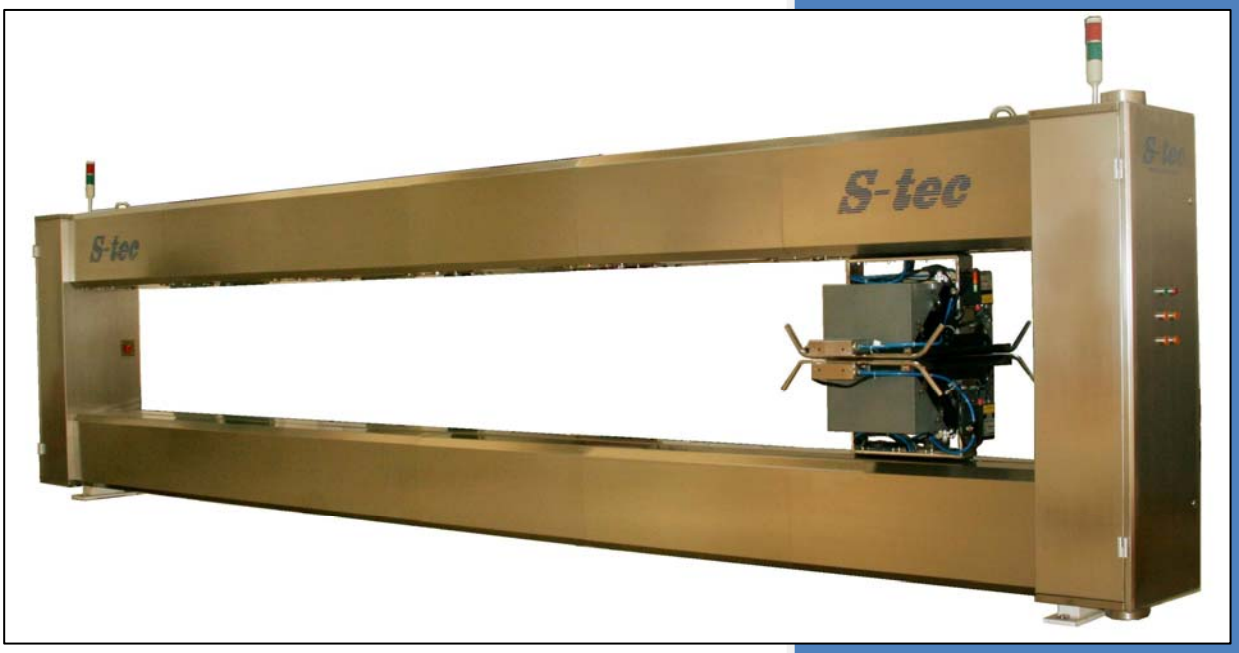
SCANNER

INSTALLATION & SERVICE MANUAL

V5.0October, 2010



CONTENTS

CHAPTER 1 ..... **4**
1.0 MECHANICAL 4
1.1 Scanner Overview 4
1.2 Sensor Mounting 5
1.3 Drive Mechanism 5
1.4 Computer Enclosure 6
1.5 Power, Ground, Compressed Air 6
CHAPTER 2 ..... **10**
2.0 INSTALLATION 10
2.1 Mounting the Scanner Frame 10
2.2 Adjustment of Sensor Head Pass Angle 12
2.3 Power Requirements 14
2.4 Grounding 14
2.5 Instrument Air 14
2.6 Cooling of the System 15
CHAPTER 3 ..... **17**
3.0 ELECTRICAL 17
3.1 Layout of components 17
3.2 System Power Distribution 18
3.3 24VDC Regulated Switch Mode Power Supplies 18
3.4 Encoder Connection 18
3.5 Scanner Drive & Inverter Control 19
3.6 Motor Control (Omron Inverter) 20
3.7 Proximity Switches 22
CHAPTER 4 ..... **29**
4.0 COMPUTER 29
4.1 Computer Enclosure Overview 29
4.2 +5V DC Power Supply 29
4.3 Digital I/O Termination Board 30
4.4 Analog I/O Termination Board 30
4.5 Tacho & Digital I/O Termination Board 31
4.6 AMPRO Little Board Computer 31
4.7 Diamond DMM32 Board 34
CHAPTER 5 ..... **47**
5.0 MAINTENANCE 47
5.1 Trouble-shooting 47
5.2 Scanner Drive Mechanism Maintenance 47
5.3 General Maintenance 51
CHAPTER 5 ..... **58**
5.0 KEY COMPONENTS 58

CHAPTER 1

SCANNER MECHANICAL

CHAPTER 1

1.0 MECHANICAL

1.1 SCANNER OVERVIEW

The purpose of the scanner is to continuously measure the important properties of the paper web for display and for control. To do this the scanner must move the sensor heads back and forth across the web. The sensor heads are equipped with Basis Weight, Moisture and Edge Sensors.

Typically a scan from one side of the paper to the other takes 15 - 20 seconds but this can be changed by programming the AC drive Inverter.

The scanner scans until either the edge sensors see the paper edge or until it reaches the turn-round proximity sensor, whichever is first. At this point the scanner heads will decelerate, stop, accelerate in the opposite direction and then scan at scan speed to the opposite paper edge or proximity sensor.

Scanning is started by pressing the "SCAN" press button on the tending side of the scanner. To send the scanner off sheet, i.e. back to the home position, the "OFF SHEET" button must be pressed.

During scanning it is very important that the top and bottom heads are kept in exact registration and do not "rock" or move relatively in any direction, MD, CD or UP/DOWN. To achieve this, the S-TEC scanner uses 4 linear rails and bearing bushings.

The Sensor Head is an enclosed unit that houses the Sensors and provides the necessary controlled environment for the Sensors to operate. This ensures accurate measurements from the Sensors over long periods and maintains reliable operation on the Paper Machine.

Control of the scanner is from the integrated micro computer system located on the tending side enclosure of the scanner. Signals go from the computer to the Inverter AC Drive. The AC drive allows the selection of scan; off-sheet & crawl speeds plus acceleration and deceleration.

Crawl speed is use for automatic alignment of the top and bottom heads. This feature ensures that the heads are correctly aligned in the CD direction while allowing such facilities as "HEAD SEPARATE"

Head Separate feature separates the heads for easy cleaning of the sensor windows and then automatic alignment again. Head Separate is initiated by pressing the "HEAD SEPARATE" button.

1.2 SENSOR MOUNTING

The Sensors are all housed within a single enclosure called the Sensor Head. This Sensor Head is made up of a Upper Head and a Lower Head. The Lower Head houses the Basis Weight Radioactive source and the Moisture Sensor IR Lamp (IR Sensor) or Passive Microwave Cavity (Microwave Sensor). The Upper Head houses the Basis Weight and Moisture Sensor receivers.

The Sensor Heads are securely bolted onto the carriage of the Scanner Drive system.

1.3 DRIVE MECHANISM

The Sensor Heads are mounted on the Scanner carriage. The carriage sits on Linear Bearings which wrap around especially hardened, 40mm diameter, steel rails. Movement of the carriage is by means of these Linear Bearings and along the rails. During Scanning, the carriage moves forward and backward across the paper all the while measuring the paper and sending Measurement signals back to the Computer for Processing. This forward and backward motion is achieved using a special Drive mechanism that is designed to give the best stability and reliability.

The Drive mechanism consists of two steel reinforced polyurethane Drive Belts, one for the top carriage and the other for the bottom. These belts are securely fastened to the respective carriages in a manner that allows the carriage to be pulled forward and backward across the paper sheet.

Both top and bottom belts are driven by toothed Pulleys which are connected to a single shaft, the top via a Clutch. As this Drive shaft rotates the belts will move and hence pulls the carriage in the desired movement direction. This Drive shaft is rotated by a Motor-Gearbox arrangement. The direction of rotation and the rotation speed of the motor determine the Scanning direction and the Scanning speed respectively of the Sensor carriage.

An electronic Inverter device is used to control the rotation speed and direction of the motor. This device ensures very stable rotational speed for the motor and is very reliable. The Power Supply input to the Inverter is single phase 220Vac 50Hz. Its output to the Drive Motor is three phase 220Vac with adjustable/variable frequency. It is this frequency that determines the speed of rotation of the motor and therefore the linear velocity of the sensors.

1.4 COMPUTER ENCLOSURE

The S-TEC Scanner system is a fully integrated and stand-alone unit. It is controlled by a computer located in the Computer Enclosure on the Tending Side of the frame. Access to the computer is by opening the stainless steel door and then removing the Perspex cover of the Computer Enclosure.

The Computer Enclosure contains the computer, cooling fan, power supplies, Analog, Digital and Encoder terminations, circuit breakers and vortex cooler. Full information about this assembly can be found in a later chapter of this manual.

Great care must be taken to protect these computer components by:

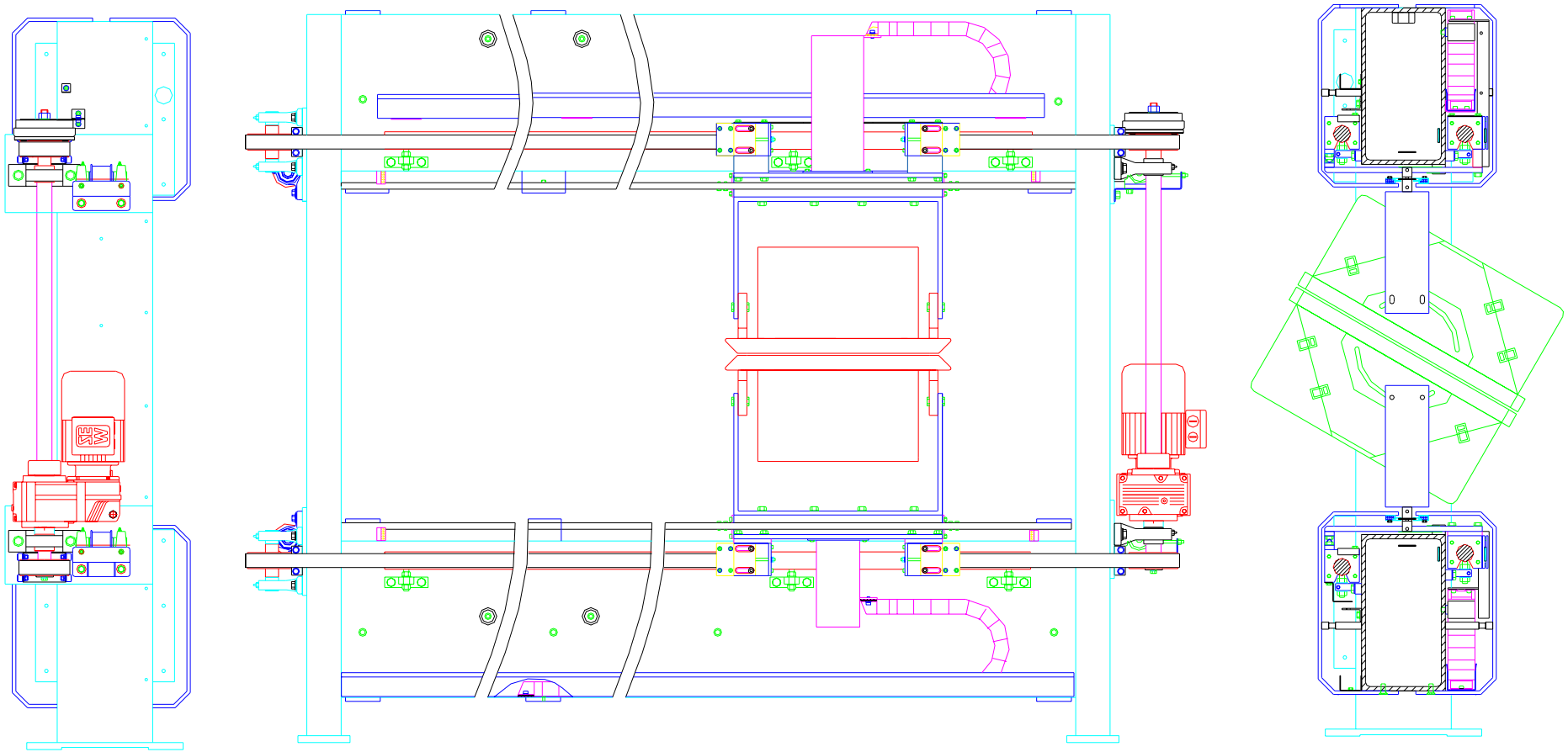
1. Ensuring the Perspex cover and the scanner door are always kept closed.
2. Ensuring that the vortex cooler has an adequate air supply and is working OK.
3. Ensuring that the internal cooling fan is working and that there is no excessive dust build-up.
4. By supplying power from a UPS power supply.

1.5 POWER, GROUND, COMPRESSED AIR

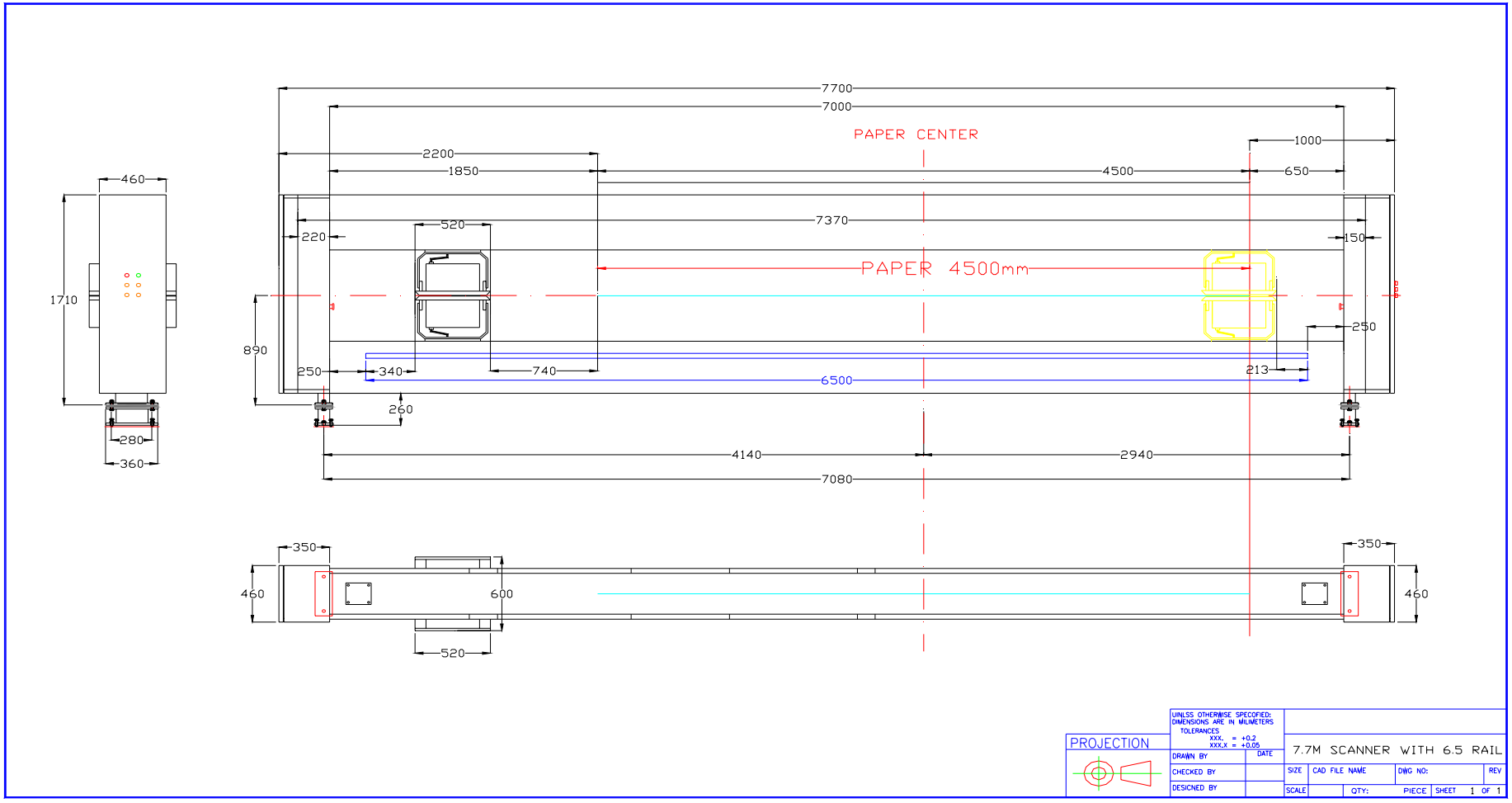
The scanner requires Power, Ground & Compressed Air utilities as follows:

UTILITY	SPECIFICATION	AMOUNT	USED FOR
UPS POWER	230VAC	1KW	Computer + Power Supplies
NORMAL POWER	230VAC	2KW	Drive + Heater + Clutch
COMPRESSED AIR	80PSI	30 CFM	For Cooling, Shutter & Purge
INSTRUMENT GND	Ground		For Sensors & I/O
ELECTRICAL GND	Ground		For P/S, motor & frame grounding

SCANNER
CONSTRUCTION



EXAMPLE SCANNER



CHAPTER 2

SCANNER INSTALLATION

CHAPTER 2

2.0 INSTALLATION

2.1 MOUNTING THE SCANNER FRAME

The S-TEC Measurement and Control system is a fully integrated stand-alone unit so there is no need for major civil works to mount the scanner or special electrical installations such as air conditioning a room for the computer system. All components are housed within the Scanner Frame. All field wiring is terminated at terminal blocks located within the Scanner Frame.

Installation of the S-TEC Scanner Frame is a very simple task, both mechanically and electrically. Basically, it consists of lifting the Scanner onto mounts installed in the selected position, adjustment of the level, adjustment of the Sensor Pass angle, connecting the Instrument Air supply and connecting the 220Vac Power Supply and Ground plus communications cable. Once these few tasks are completed the system is ready for operation.

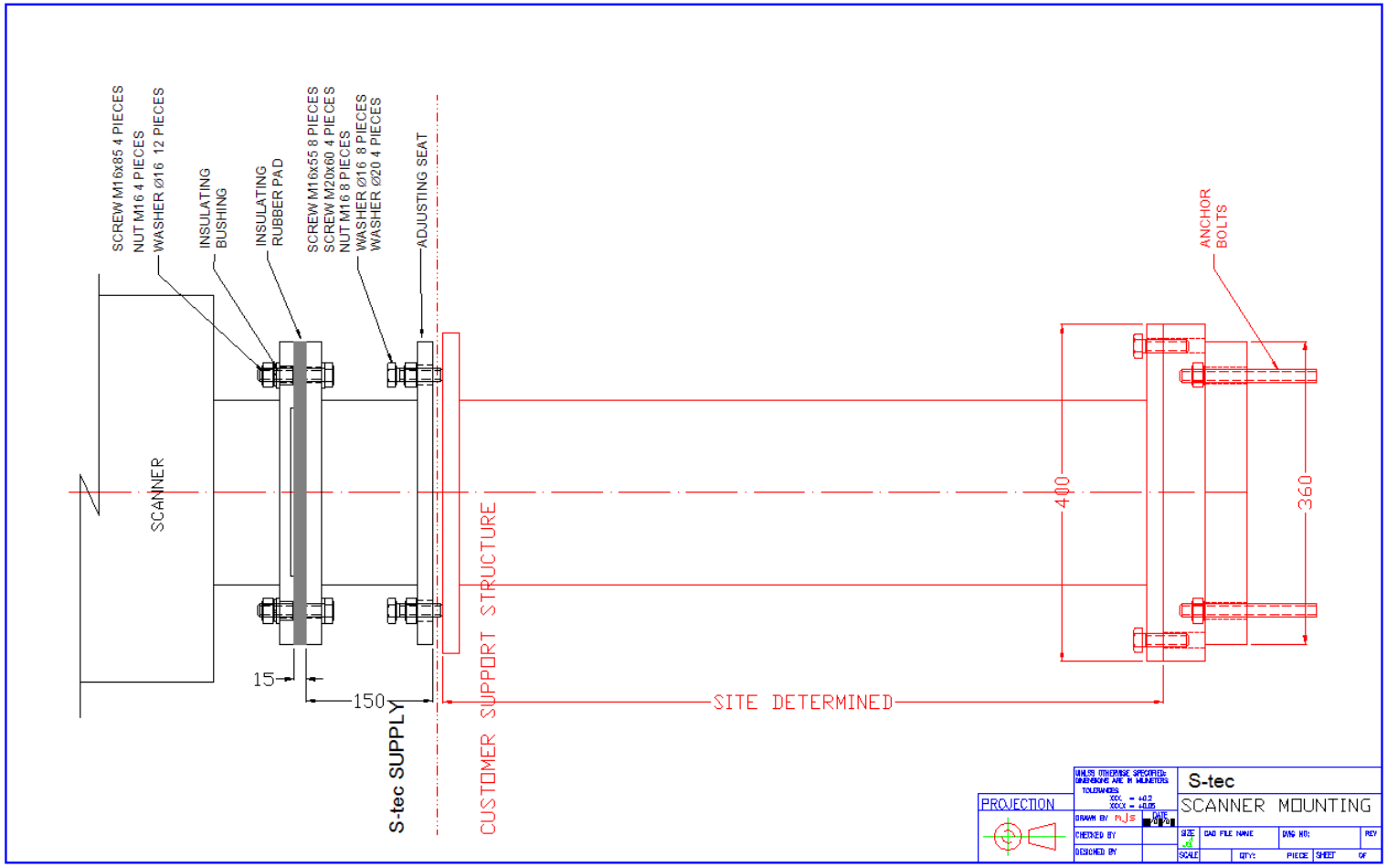
The Scanner Frame can be lifted as a single unit using the lifting "eye" bolts provided. These "eye" bolts screw in the top beam of the Scanner and can be removed later and the hole covers replaced.

The Scanner must be mounted on Scanner Footings which allows some height adjustment. The Customer should prepare the footings before the Scanner arrives on site. Two such footings are required, one for each leg of the Scanner, and fabrication of these are the responsibility of the Paper Mill. Once the Footings are put in place and leveled, the Scanner can be lifted and placed onto these Footings. Final height and leveling is done by adding or removing shims.

The Scanner must be electrically isolated from the Footing and the rest of the Paper Machine. A rubber Insulation pad with nylon insulating bushings is provided to give this required insulation. The Scanner sits on this Insulation pad and is held in place by four bolts, 2 for each leg of the Scanner, which bolt onto the Scanner Footings. The nylon bushings insulate the bolts from the scanner frame.

This method of Installation ensures that the Scanner ground has no direct contact with nearby parts of the Paper Machine. The Scanner ground is terminated by a thick and dedicated ground wire to a proper and suitable Electrical ground provided by the customer. This ground should not have more than 3Ω resistance.

TYPICAL MOUNTING ARRANGEMENT



The Paper sheet needs to pass in between the top and bottom Sensor Heads as the Scanner is scanning. This defines the height of the Scanner footing required. The recommended method is to make the Scanner footing such that it is about 10mm short of the required height. The final fine adjustments will be made using shims. These shims are added in small increments until the paper sheet passes exactly through the middle of the Sensor Heads. Before making these adjustments the Sensor Head Pass Angle must first be adjusted.

2.2 ADJUSTMENT OF SENSOR HEAD PASS ANGLE

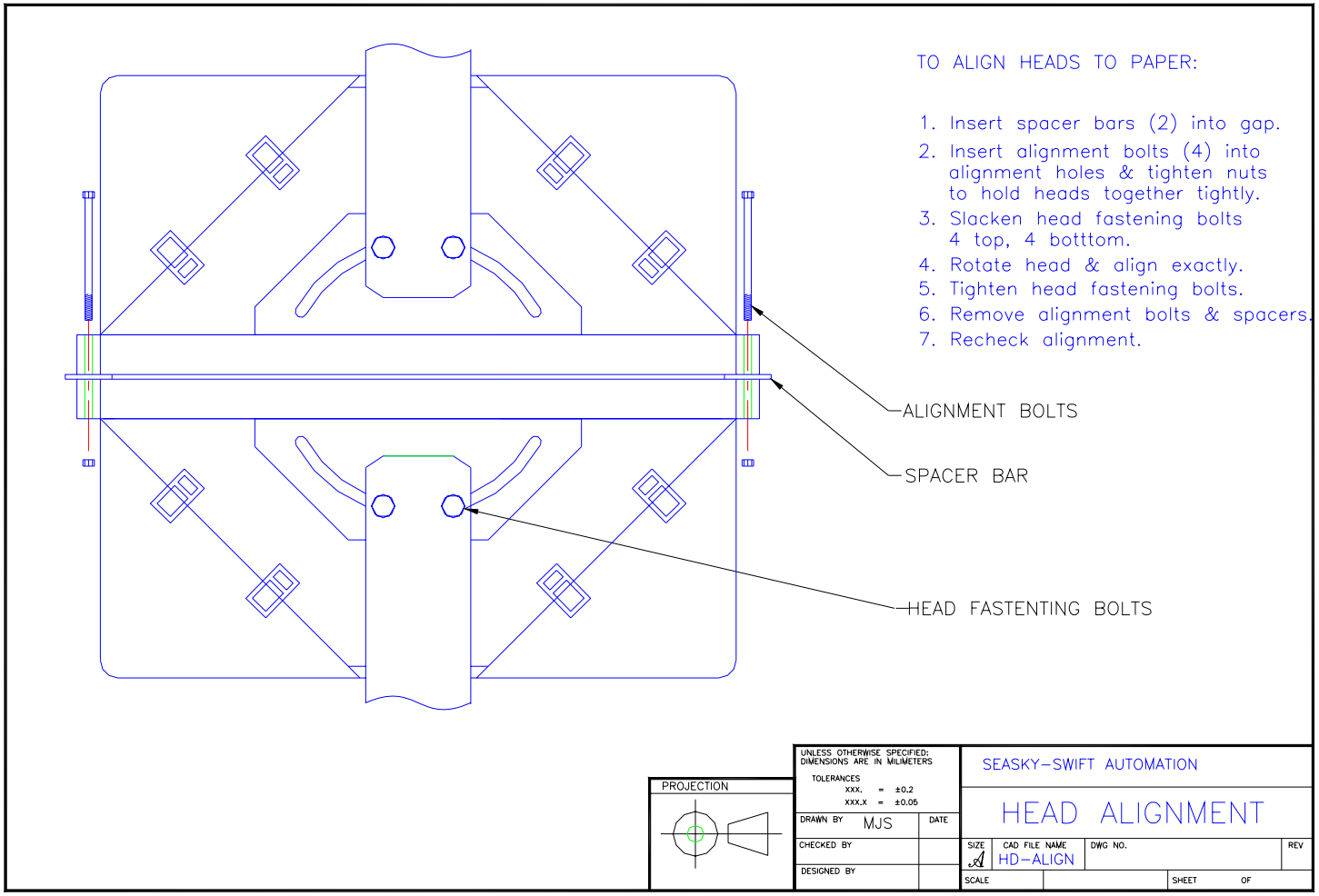
Once the Scanner Frame is placed in location the Sensor Heads must be checked for the correct Pass Angle such that the paper web will pass through the gap between the Sensor Heads. This adjustment is also made easy with the S-TEC Measurement and Control system.

Two spacer bars are included with the system. These spacer bars are placed within the Sensor Heads gap such that the four alignment bolts can pass through the top head, spacer bar and the lower head smoothly. These four alignment bolts ensure that the top and bottom Sensor Heads are aligned to each other and then the bolts are tightened to hold them exactly together. The spacer bars ensure that the correct Sensor measurement gap between the Sensor Heads is maintained during the adjustment.

With the measurement gap fixed, the Sensor Heads can now be rotated. The four alignment bolts will ensure proper alignment of the top and bottom heads as the Heads are rotated to achieve the desired Pass angle. To rotate the Heads the four bolts which hold each Sensor Head on to the mounting brackets of the Scanner carriage must be loosened. Care must be taken here because the Heads are very heavy (about 30kg for each Sensor Head). It is recommended that this alignment job is done with at least 3 people, two for supporting and rotating the Sensor Heads and the third loosening and tightening the bolts.

The Paper Pass Angle can be simulated by pulling strings along the Paper run direction. It is recommended to pull 3 strings, one at each sheet edge at a location which would represent the real sheet edges while the third string to be somewhere in the centre of the paper web. The Sensor heads can be moved across the 3 strings to check for the correct pass angle and further adjustments made until the sensors make a clean pass across the strings.

Final adjustments to the Scanner height can then be made. Once this is done all the bolts must be securely fastened to maintain this alignment situation. There should be no further need to re-align the Scanner once this procedure is completed.


TO ALIGN HEADS TO PAPER:
1. Insert spacer bars (2) into gap.
2. Insert alignment bolts (4) into alignment holes & tighten nuts to hold heads together tightly.
3. Slacken head fastening bolts 4 top, 4 botttom.
4. Rotate head & align exactly.
5. Tighten head fastening bolts.
6. Remove alignment bolts & spacers.
7. Recheck alignment.
ALIGNMENT BOLTS
SPACER BAR
HEAD FASTENTING BOLTS
PROJECTION
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILIMETERS
TOLERANCES
XXX. = ±0.2
XXX.X = ±0.05
DRAWN BY MJS
DATE
CHECKED BY
DESIGNED BY
SEASKY-SWIFT AUTOMATION
HEAD ALIGNMENT
SIZE A
CAD FILE NAME HD-ALIGN
DWG NO.
REV
SCALE
SHEET OF

2.3 POWER REQUIREMENTS

The S-TEC Measurement and Control system requires a single phase 220Vac 50Hz UPS Power Supply for operation. All other system power requirements are derived from this single Power source. This makes it a very simple system to install and start up.

Assuming the first option, it is recommended that the Paper Mill supplies this Power from a dedicated UPS rated at 3kW with a Circuit Breaker and using 3-core Power cables each core size of $4mm^2$. This cable is terminated inside the Scanner front end-bell on the left side on the Terminal block TB3.

As an alternative two supplies, one smaller UPS supply and on unregulated supply can be used. In this case the UPS supply will be used to power the computer and sensor electronics while the unregulated supply will power the motor and heater/clutch power supply.

2.4 GROUNDING

It is necessary that the S-TEC Measurement and Control system is provided with a very good ground. The whole system is designed with heavy consideration given to grounding. The grounding supplied must be not more than 3Ω using the normal methods of ground measurement. It is recommended that the Grounding wire to be connected to the system has a core size of at least $8mm^2$.

A separate instrument ground is desirable for the computer and sensors.

2.5 INSTRUMENT AIR

The S-TEC Measurement and Control system relies on good, clean, oil free and dry Instrument Air for system cooling, radiation source shutter operation and air curtains for the Sensors. It is therefore **very important** to ensure that a good air supply is given for this purpose. Having high quality air will ensure long and trouble-free operation of the S-TEC Measurement and Control system.

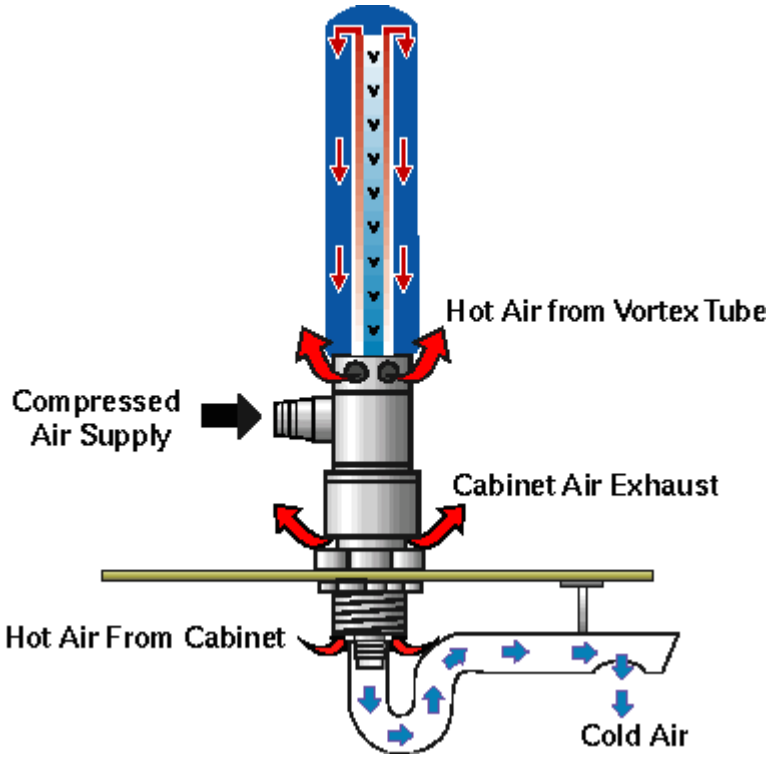
The Paper Mill is required to supply the necessary filter; regulator, water separator and oil filter as necessary for this purpose. The minimum air pressure required is 60psig but 80psig is preferred. A push-in connection is provided for this air under the front end enclosure of the scanner frame. This is the only air connection necessary for the S-TEC Measurement and Control system. All cooling, shutter operation and air curtains are derived from this air source.

2.6 COOLING OF THE SYSTEM

The Scanner front end-enclosure contains the computer box which is cooled by a Vortex type air cooler. This type of cooler has no moving parts and is very reliable provided the air is clean.

The vortex cooler works on a principle of conservation of angular momentum. The air is forced to spin at very high angular speed (>1,000,000 rpm) inside the device. This high speed air is mechanically guided in such a way that the air finally splits into two streams, one hot and the other cold. This is then piped out to the cold side outlet and the hot side outlet to be used as necessary. The temperature of the cool air coming out from the Vortex cooler depends on the air pressure at the inlet. The higher the inlet pressure the cooler the cold side outlet air, similarly with the hot side.

VORTEX COOLER



The Vortex cooler is mounted on the bottom of the computer enclosure. The cold air enters the enclosure for cooling and pressurization purposes.

The hot side is left to blow into the Scanner Frame inside the stainless steel covers. This also ensures a slight positive pressure throughout the bottom part of the Scanner which helps keep out the dust.

The upper and lower sensor heads are also cooled in the same way. The hot side air is used here for the air curtains that surround the measurement windows of the Sensors. The details of this can be found in the S-TEC Sensor Heads Manual.

CHAPTER 3

SCANNER ELECTRICAL

CHAPTER 3

3.0 ELECTRICAL

3.1 LAYOUT OF COMPONENTS

The S-TEC Measurement and Scanner Control components are all housed within the stainless steel covered Scanner Frame. Access to all components is possible by removing the stainless steel covers.

The computer enclosure is housed inside the front end-enclosure of the scanner frame. Also on the tending side (and optionally also on the drive side) of the scanner are the control press buttons and indicators for scanner control.

All cable terminations for the system are done through terminal blocks. These terminal blocks are all located inside the Scanner Frame and inside the front enclosure. AC Power and Ground are terminated in the front enclosure.

24VDC regulated power supply (for clutch and head heaters) and the control relays for the scanner control, are in the tending side end enclosure.

The drive side end enclosure of contains the mechanical hardware for the scanner drive system. This side of the scanner is called the “Drive Side” as it contains all the Drive components which move the Sensor Heads across the paper sheet. It is also typically located on the “Drive Side” of the paper machine.

The sensor heads rely for alignment on two proximity switches, one on the upper beam and the other on the lower beam in the Off Sheet or “home” position. The home position is normally near to the drive side of the scanner. Towards the centre of the scanner is a mid position proximity switch which checks the position of the Sensor Heads as it scans across the sheet and can reset the position in case of drift. Tending side and drive side scan limit proximity switches are provided which will turn the scanner around if reached before the edge of the sheet is detected.

For safety purposes there are a total of four crash switches which cut off power to the system should the Sensor Heads travel too far at each end. Two switches are located in the front side while the other two are located at drive side of the scanner.

Two Emergency cut-off switches are also provided in cases it may be necessary to stop the Scanner manually. These switches are located externally on each end of the Scanner. This switch is a latch type which is activated by pressing the button. Once depressed the button will latched until the operator releases it by rotating the switch. Once the button is released, normal operation of the Scanner can be resumed.

3.2 SYSTEM POWER DISTRIBUTION

The S-TEC Measurement and Control system typically requires two single phase 220Vac 50/60Hz power supplies. One rated at 1 kW from the normal electrical power supply and the other 1kW from a UPS supply. These are terminated on cables in the front end enclosure. Alternatively all can be powered from a single UPS power supply.

3.3 24VDC REGULATED SWITCH MODE POWER SUPPLIES

There are two regulated 24Vdc Power Supplies used in the S-TEC Measurement and Control system:

1. 24VDC Switch mode regulated Power Supply which is located inside the Computer Enclosure. It is used for buttons, lamps, shutter solenoid, flag solenoid, relay operation, proximity switches etc.
2. 24VDC Switch mode regulated Power Supply which is located above the computer enclosure. It is used to drive the magnetic clutch and for the sensor heads heating.

3.4 ENCODER CONNECTION

The encoder (tachometer) is connected directly to the tacho terminations inside the Computer Enclosure. It uses the same +5VDC supply that the computer uses. The shield of the tacho cable is grounded to the common ground.

3.5 SCANNER DRIVE & INVERTER CONTROL

The function of the Scanner is to carry the Sensor Heads back and forth across the paper sheet as the paper is being reeled. This action enables the Sensors to measure the Basis Weight and Moisture of the sheet continuously as the paper is being reeled. Because Paper manufacturing is a 24 Hour process, the mechanism for this function must be able to maintain alignment at all times between the upper and lower Sensor Heads as they move across the sheet. The mechanism must also be stable and very reliable. The S-TEC Measurement and Control system Scanner Drive Mechanism meets all these requirements.

The Drive mechanism is driven by a 3∅ motor whose speed and direction of rotation is controlled by the Inverter Drive. The set-up of the inverter is listed in the pages below.

The program for the Inverter is fixed during manufacturing and is not normally changed by the customer. To change the set-up requires an AB programming module which can be inserted into the front of the Inverter.

Contact Output signals from the Digital I/O Boards in the Computer Enclosure drive interfacing 24VDC relays. The relays signal to the Inverter the direction of travel (forward/reverse) and the speed (Scan, Off-sheet, Crawl, Stop). The Inverter takes care of the acceleration and deceleration.

A	**B**	
0	0	STOP
0	1	CRAWL
1	0	SCAN
1	1	OFF SHEET

The Scan speed is used during normal Scanner operation when the Sensors are moved forward and backwards across the sheet.

The Off Sheet speed is used during sheet breaks when it is necessary for the Sensors to go off-sheet quickly.

The Crawl speed is used when the Sensor Heads are being aligned after being separated for cleaning or whatever purpose.

3.6 MOTOR CONTROL (OMRON INVERTER)

The S-TEC Measurement and Control system uses a 3Φ 220Vac 50Hz 550W motor to drive the Scanner carriage. This motor is direct coupled to a Harmonic gear type gearbox which drives the Drive shaft using toothed pulleys and a timing belt.

The speed of the motor determines the scanning speed of the Scanner as it traverses the sheet. This speed is controlled by the Invertor Drive which provides variable frequency 3Φ 220Vac Power output from a single 1Φ 220Vac 50Hz Power supply. This type of speed control is very accurate as the speed adjustment is frequency based.

GROUP	SET-UP DATA	UNITS	FACTORY DEFAULT	S-TEC STANDARD
n01	Allow Parameter Setting		0	1
n02	Multifunction		0	1
n03	Frequency Reference (n21)		0	1
n04	Frequency Deceleration		0	0
n05	Reverse Rotation Possible		0	0
n06	Stop / Reset Key Enable (0)		0	1
n07	Local Mode Only		0	0
n08	Enter Key Enabled		0	0
n09	Maximum Frequency	Hz	60	80
n10	Max Voltage (VMAX)	V	200	200
n11	Maximum Voltage Frequency (FA)	Hz	60	60
n12	Middle Output Frequency (FB)	kHz	1.5	1.5
n13	Middle O/P Frequency Voltage (VC)	V	12	12
n14	Minimum O/P Frequency (FM)	kHz	1.5	1.5
n15	Minimum O/P Frequency Voltage (Vmin)	V	12	12
n16	Acceleration Time 1	S	10	1
n17	Deceleration Time 1	S	10	1
n18	Acceleration Time 1	S	10	1
n19	Deceleration Time 1	S	10	1
n20	S-shape Accel/Dec Characteristic		0	0
n21	Frequency Ref 1 (Stop)	Hz	6	0
n22	Frequency Ref 2 (Crawl)	Hz	0	3
n23	Frequency Ref 3 (Scan)	Hz	0	50
n24	Frequency Ref 4 (Off Sheet)	Hz	0	55
n25	Frequency Ref 5 (not used)	Hz	0	0
n26	Frequency Ref 6 (not used)	Hz	0	0
n27	Frequency Ref 7 (not used)	Hz	0	0
n28	Frequency Ref 8 (not used)	Hz	0	0
n29	Inching Frequency	Hz	6	0
n30	Frequency Reference UL	%	100	100
n31	Frequency Ref LL	%	0	0
n32	Rated Motor Current	A	0.1	1.8
n33	Protection Mode		0	0

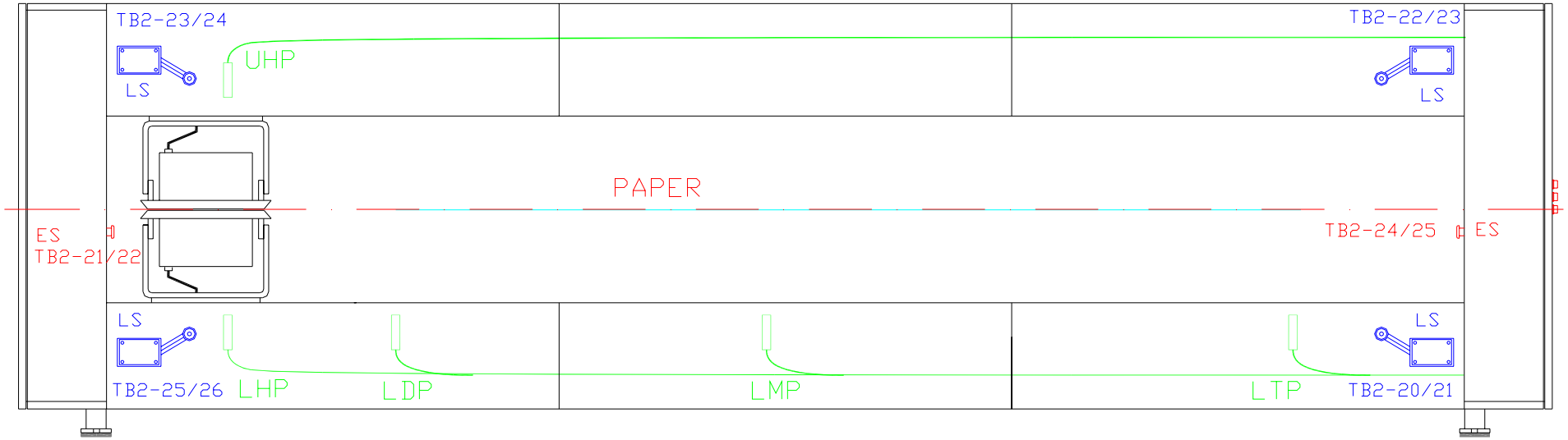
n34	Motor Protection Time	Min	8	5
n35	Fan Rotates while RUN		0	0
n36	S2		2	1
n37	S3		5	0
n38	S4		3	6
n39	S5		6	7
n40	Multifunction O/P Terminal (Running)		1	1
n41	REF Frequency Gain	%	100	100
n42	REF Frequency Bias	%	0	0
n43	Analog Freq ref Filter	S	0.1	0.1
n44	Analog O/P		0	0
n45	Analog O/P Gain		1	1
n46	Carrier Frequency Select		N/C	4
n47	Inverter Restarts on Power Up		0	2
n48	Auto Retries on fault		0	0
n49	Jump Frequency 1		0	0
n50	Jump Frequency 2		0	0
n51	Jump Width		0	0
n52	DC Control Current	%	50	50
n53	Interrupt DC Control Time	S	0.5	0.5
n54	Start-up DC Control Time		0	0
n55	Stall Prevention During Deceleration		0	0
n56	Stall Prevention Level	%	170	170
n57	Stall Prevention During Operation	%	160	160
n58	Freq Det Level		0	0
n59	Over torque Detection		0	0
n60	Over torque Detection Level		160	160
n61	Over torque Time	S	0.1	0.1
n62	Don’t UP/Down		0	0
n63	Torque Compensation Gain		1	1
n64	Motor Rated Slip		2.9	2.9
n65	Motor No Load Current		62	62
n66	Slip Compensation		0	0
n67	Slip Compensation T/C		2	2

3.7 PROXIMITY SWITCHES

Alignment is automatically checked when the scanner is sent off sheet and the alignment procedure is initiated if the heads are not perfectly aligned. This automatic alignment depends entirely on two Proximity Switches located near the drive side of the scanner frame at the scanner home position, one on the upper beam and the other on the lower scanner beam. These Proximity Switches are adjusted such that when the sensor heads are in the home position the alignment pins passes through the upper and lower sensor heads alignment holes. The signals from these Proximity Switches ultimately connect to the Digital I/O terminations in the computer enclosure.

This alignment is already factory set. But sometimes due to transportation and other causes, this setting may need to be readjusted. In such cases it is necessary to do some re-alignment by adjusting the Proximity Switch position until the Sensor Heads are aligned in the Home position as described above. This is a very simple task.

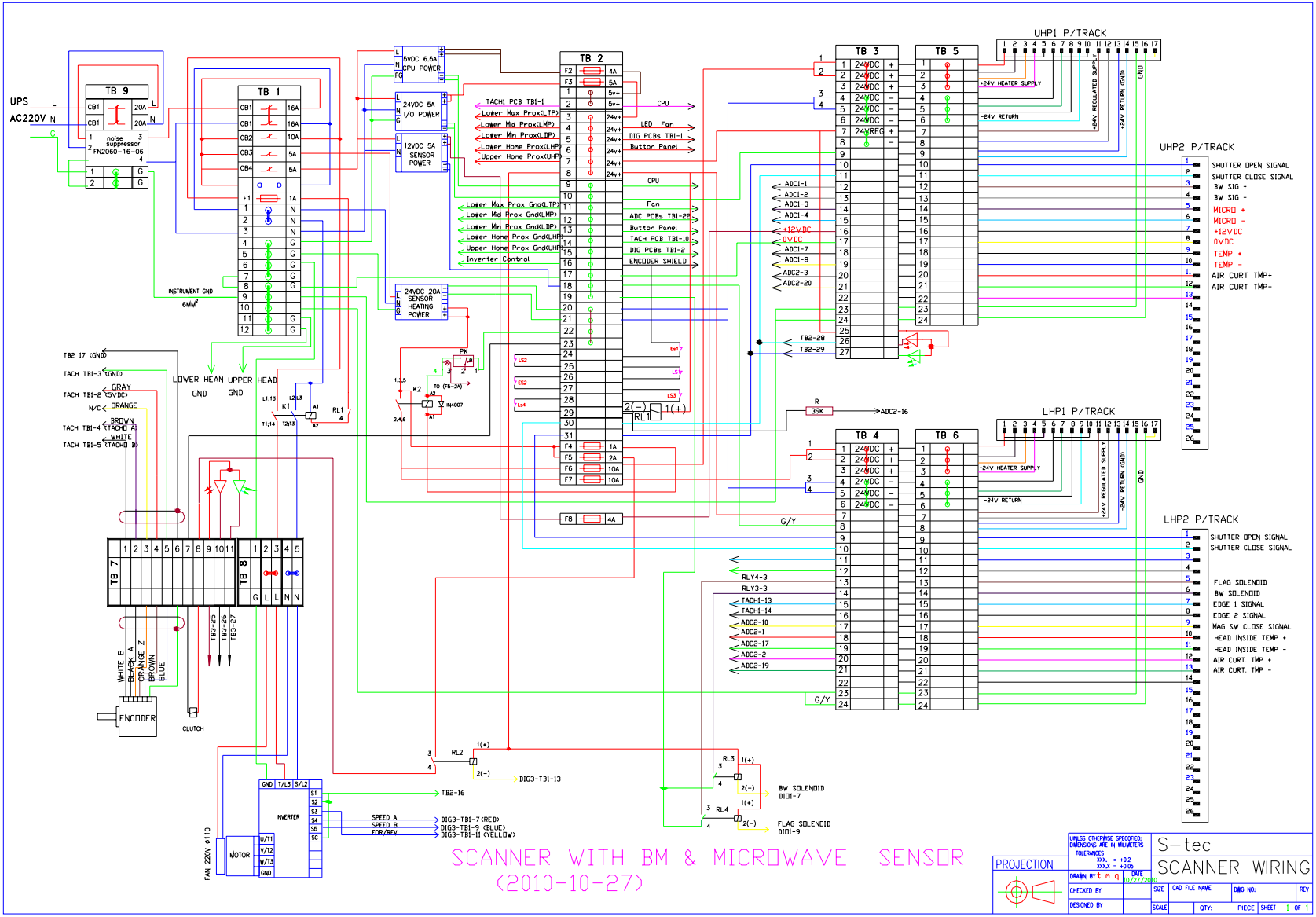
SCANNER PROMXIMITY SENSORS



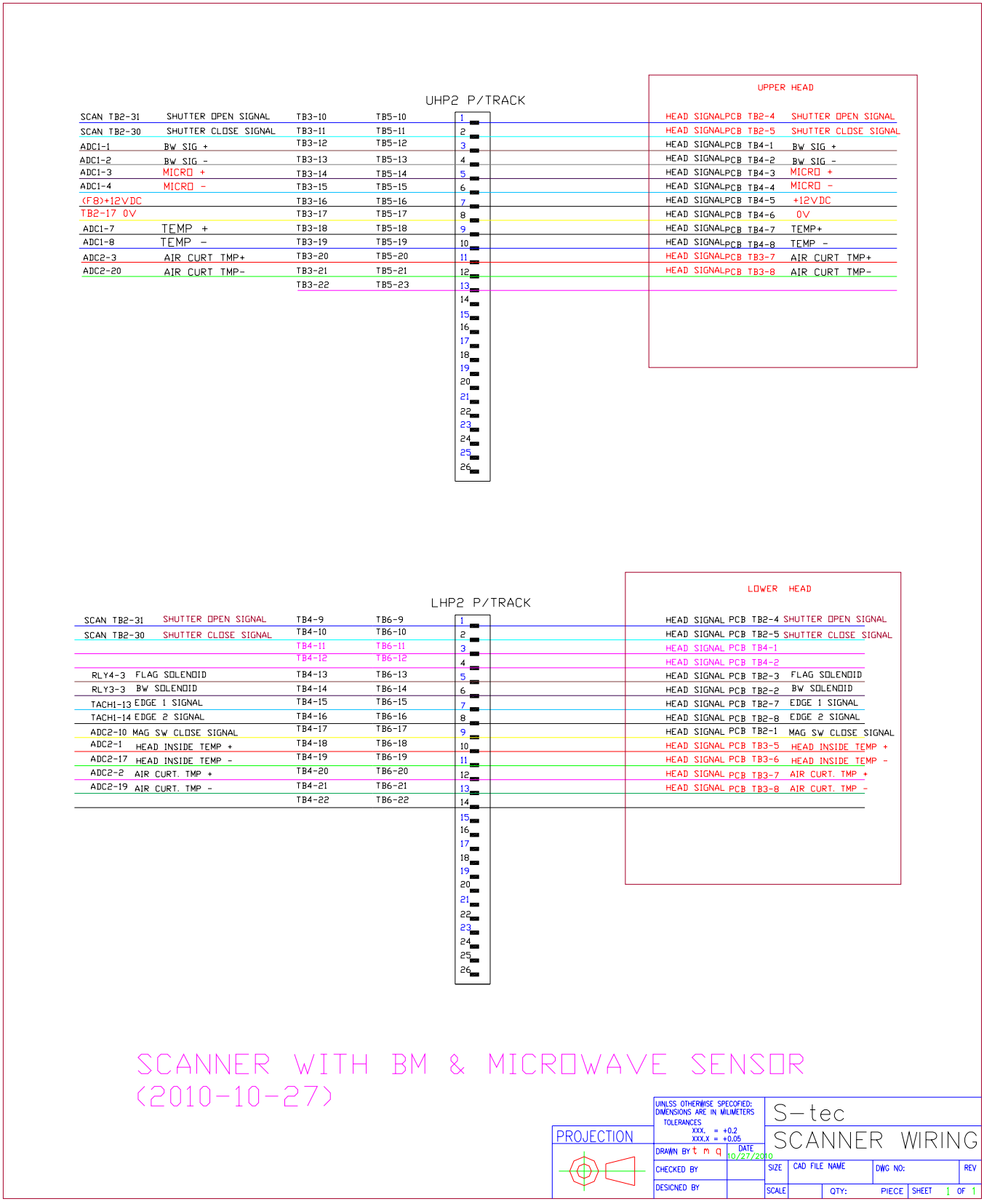
UHP = Upper Home Prox
LHP = Lower Home Prox
LDP = Lower Driveside Prox
LMP = Lower Mid Prox
LTP = Lower Tendingside Prox
LS = Limit Switch
ES = Emergency Stop Button (twist to open)

NOTE: Limit Switches & Emergency Stop Switches are in series with the sheet threader interlock relay to operate relay RL-1. RL-1 operates contactor A1 which applies power to the AB Inverter Drive. Note that the Compressed Air Pressure Switch provides power to this contactor. If there is low compressed air pressure then Contactor A1 will not operate.

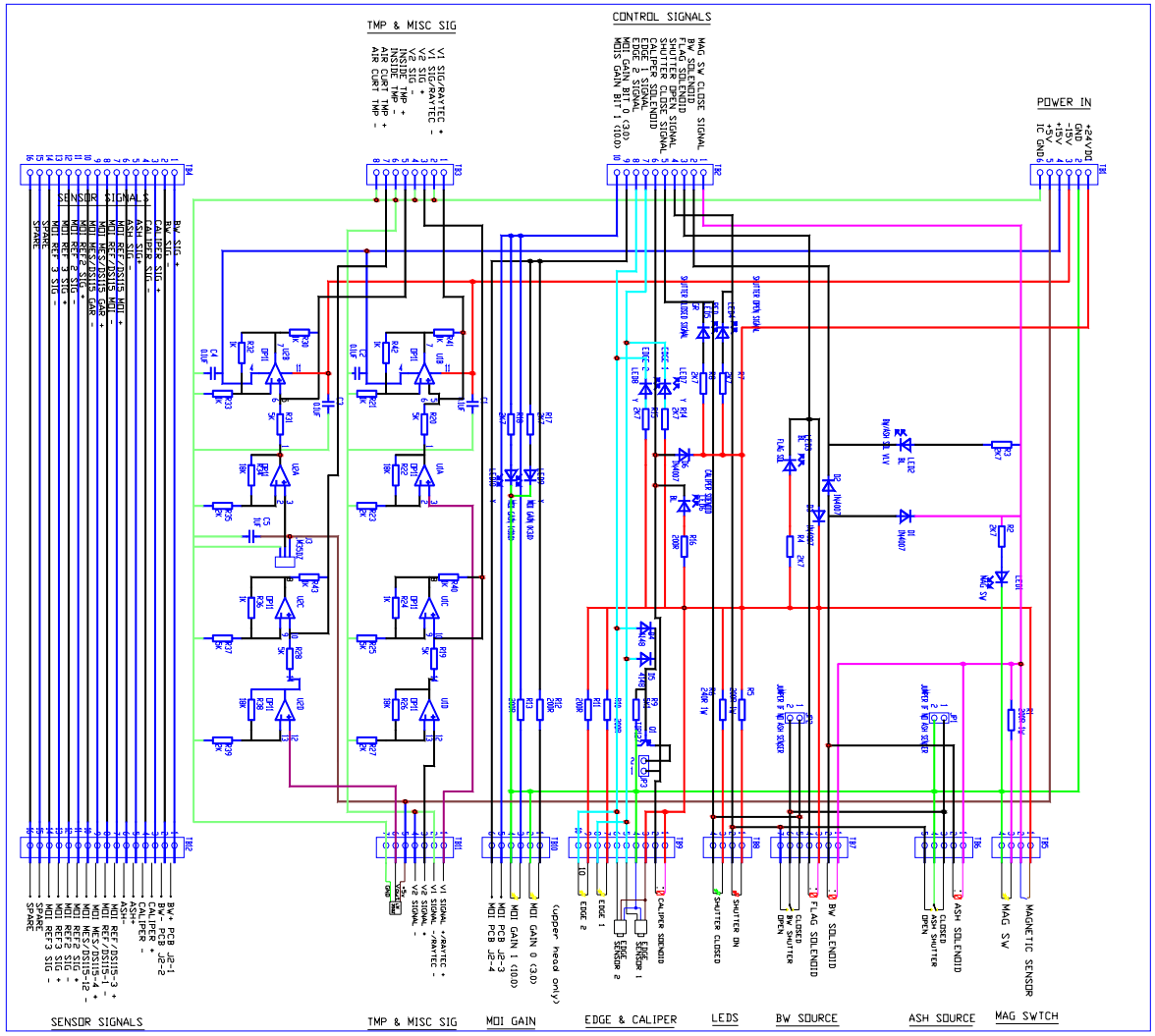
PICTURE SHOWS DRIVE SIDE LIMIT SWITCH + UPPER HOME PROXIMITY SWITCH


TB 9
TB 1
TB 2
TB 3
TB 4
TB 5
TB 6
TB 7
TB 8
UPS
AC220V
UHP1 P/TRACK
UHP2 P/TRACK
LHP1 P/TRACK
LHP2 P/TRACK
SHUTTER OPEN SIGNAL
SHUTTER CLOSE SIGNAL
BW SIG +
BW SIG -
MICRO +
MICRO -
+12VDC
0VDC
TEMP +
TEMP -
AIR CURT TMP+
AIR CURT TMP-
FLAG SOLENOID
BW SOLENOID
EDGE 1 SIGNAL
EDGE 2 SIGNAL
MAG SW CLOSE SIGNAL
HEAD INSIDE TEMP +
HEAD INSIDE TEMP -
AIR CURT. TMP +
AIR CURT. TMP -
+24V HEATER SUPPLY
-24V RETURN
+24V REGULATED SUPPLY
-24V RETURN (GND)
GND
ENCODER
CLUTCH
INVERTER
MOTOR
FAN 220V ø110
SCANNER WITH BM & MICROWAVE SENSOR
(2010-10-27)
PROJECTION
S-tec
SCANNER WIRING
DRAWN BY
CHECKED BY
DESIGNED BY
DATE
10/27/2010
SIZE
CAD FILE NAME
DWG NO:
REV
SCALE
QTY:
PIECE
SHEET 1 OF 1

POWER TRACK SIGNALS


UHP2 P/TRACK
SCAN TB2-31 SHUTTER OPEN SIGNAL TB3-10 TB5-10
SCAN TB2-30 SHUTTER CLOSE SIGNAL TB3-11 TB5-11
ADC1-1 BW SIG + TB3-12 TB5-12
ADC1-2 BW SIG - TB3-13 TB5-13
ADC1-3 MICRO + TB3-14 TB5-14
ADC1-4 MICRO - TB3-15 TB5-15
(F8)+12VDC TB3-16 TB5-16
TB2-17 0V TB3-17 TB5-17
ADC1-7 TEMP + TB3-18 TB5-18
ADC1-8 TEMP - TB3-19 TB5-19
ADC2-3 AIR CURT TMP+ TB3-20 TB5-20
ADC2-20 AIR CURT TMP- TB3-21 TB5-21
TB3-22 TB5-23
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
UPPER HEAD
HEAD SIGNALPCB TB2-4 SHUTTER OPEN SIGNAL
HEAD SIGNALPCB TB2-5 SHUTTER CLOSE SIGNAL
HEAD SIGNALPCB TB4-1 BW SIG +
HEAD SIGNALPCB TB4-2 BW SIG -
HEAD SIGNALPCB TB4-3 MICRO +
HEAD SIGNALPCB TB4-4 MICRO -
HEAD SIGNALPCB TB4-5 +12VDC
HEAD SIGNALPCB TB4-6 0V
HEAD SIGNALPCB TB4-7 TEMP+
HEAD SIGNALPCB TB4-8 TEMP -
HEAD SIGNALPCB TB3-7 AIR CURT TMP+
HEAD SIGNALPCB TB3-8 AIR CURT TMP-
LHP2 P/TRACK
SCAN TB2-31 SHUTTER OPEN SIGNAL TB4-9 TB6-9
SCAN TB2-30 SHUTTER CLOSE SIGNAL TB4-10 TB6-10
TB4-11 TB6-11
TB4-12 TB6-12
RLY4-3 FLAG SOLENOID TB4-13 TB6-13
RLY3-3 BW SOLENOID TB4-14 TB6-14
TACH1-13 EDGE 1 SIGNAL TB4-15 TB6-15
TACH1-14 EDGE 2 SIGNAL TB4-16 TB6-16
ADC2-10 MAG SW CLOSE SIGNAL TB4-17 TB6-17
ADC2-1 HEAD INSIDE TEMP + TB4-18 TB6-18
ADC2-17 HEAD INSIDE TEMP - TB4-19 TB6-19
ADC2-2 AIR CURT. TMP + TB4-20 TB6-20
ADC2-19 AIR CURT. TMP - TB4-21 TB6-21
TB4-22 TB6-22
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
LOWER HEAD
HEAD SIGNAL PCB TB2-4 SHUTTER OPEN SIGNAL
HEAD SIGNAL PCB TB2-5 SHUTTER CLOSE SIGNAL
HEAD SIGNAL PCB TB4-1
HEAD SIGNAL PCB TB4-2
HEAD SIGNAL PCB TB2-3 FLAG SOLENOID
HEAD SIGNAL PCB TB2-2 BW SOLENOID
HEAD SIGNAL PCB TB2-7 EDGE 1 SIGNAL
HEAD SIGNAL PCB TB2-8 EDGE 2 SIGNAL
HEAD SIGNAL PCB TB2-1 MAG SW CLOSE SIGNAL
HEAD SIGNAL PCB TB3-5 HEAD INSIDE TEMP +
HEAD SIGNAL PCB TB3-6 HEAD INSIDE TEMP -
HEAD SIGNAL PCB TB3-7 AIR CURT. TMP +
HEAD SIGNAL PCB TB3-8 AIR CURT. TMP -
SCANNER WITH BM & MICROWAVE SENSOR
(2010-10-27)
PROJECTION
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILIMETERS TOLERANCES XXX. = +0.2 XXX.X = +0.05
DRAWN BY t m q
DATE 10/27/2010
CHECKED BY
DESIGNED BY
S-tec
SCANNER WIRING
SIZE
CAD FILE NAME
DWG NO:
REV
SCALE
QTY:
PIECE
SHEET 1 OF 1

SIGNAL DISTRIBUTION PCB



CHAPTER 4

SCANNER COMPUTER

CHAPTER 4

4.0 COMPUTER

4.1 COMPUTER ENCLOSURE OVERVIEW

The Computer Enclosure is an anodised aluminium enclosure with clear Perspex cover. The enclosure houses the computer, cooling fan, +5VDC computer supply, +24VDC process supply; Digital I/O Isolation and Terminations; Analog I/O Terminations, Tacho Terminations and power/ground connections for the enclosure. Information on each of the above items is below.

The enclosure is cooled using a Vortex Cooler mounted under the cabinet with the cold fraction entering the enclosure and hot fraction escaping into the scanner end enclosure.

It is important to keep the Perspex cover on the enclosure to ensure that no dust, dirt or moisture can enter and to keep the cool air from the vortex cooler inside.

4.2 +5V DC POWER SUPPLY

The +5VDC regulated power supply is a switch mode. It provides all the power for the computer and also powers the Encoder.

The power supply is adjusted using the potentiometer to +5.0VDC at the computer terminals.

There is no maintenance to be done on this power supply other than to ensure the voltage is correct with little noise and that it remains clean.

4.3 DIGITAL I/O TERMINATION BOARD

This board is the interface between the computer (DMM32) and most of the discrete inputs and outputs. It provides isolation and indication both for inputs and outputs.

Each board (of 3) can handle up to 8 digital inputs or 8 digital outputs or 4 digital inputs + 4 digital outputs, depending on the computer configuration and the position of jumpers on the board.

Isolation for digital outputs is by way of DIL socket mounted Reed Relays. These provide excellent isolation. An LED indicates when an output is ON.

Isolation for digital inputs is by way of dual darlington Opto Isolator ICs. An LED is lit when there is an input to the circuit.

4.4 ANALOG I/O TERMINATION BOARD

This board is the interface between the computer (DMM32) and all Analog inputs.

Each (of 2) board can handle either 8 differentially connected analog inputs OR 16 single ended analog inputs. The configuration is determined in the software and on the hardware links of the DMM-32 board.

The board will accept 0 - 10V signals. These signals can be conditioned by connecting R/C capacitive filtering on the board. Low voltage Varistors are installed to help protect the computer from any high voltage connections to the terminations.

Jumper connections on the board determine which set of analog inputs this board connects to. Jumpers also determine if a parallel 5k0 resistor is connected across the differential inputs to convert 0 - 2mA sensor signals to 0 - 10VDC. Other jumpers can be used to pull inputs to ground if unused or to divide the input voltage if >10VDC eg. 24VDC signal from the magnetic switch.

4.5 TACHO & DIGITAL I/O TERMINATION BOARD

This board makes the connections to the encoder and decodes the quadrature tacho signal to determine the direction of travel. The direction signal and the pulses from the tacho are sent to the computer (DMM) so that the computer can know the position of the scanner heads.

Two additional Contact Inputs and three additional Contact Output are available on this board.

4.6 AMPRO LITTLE BOARD COMPUTER

The AMPRO Little Board computer has a Pentium processor. The computer has only one power supply need (+5VDC) and has many input and output capabilities. While not used for the scanner application, the computer has keyboard; VGA Video; LCD Screen; Hard Disk; Floppy Disk; ON/Off Switch etc.

For the scanner application the computer I/O capability is utilised for:

Compact Flash Memory (typically 128mb)

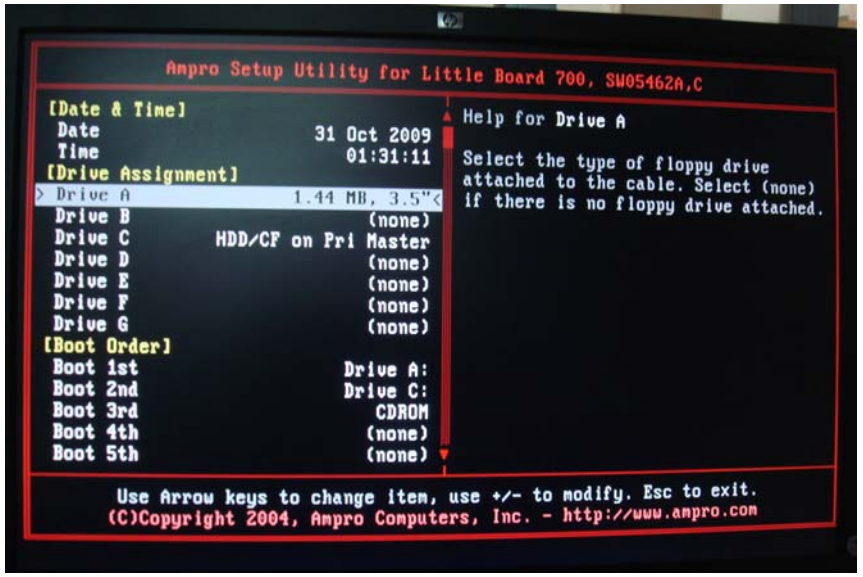
Ethernet 100BaseT

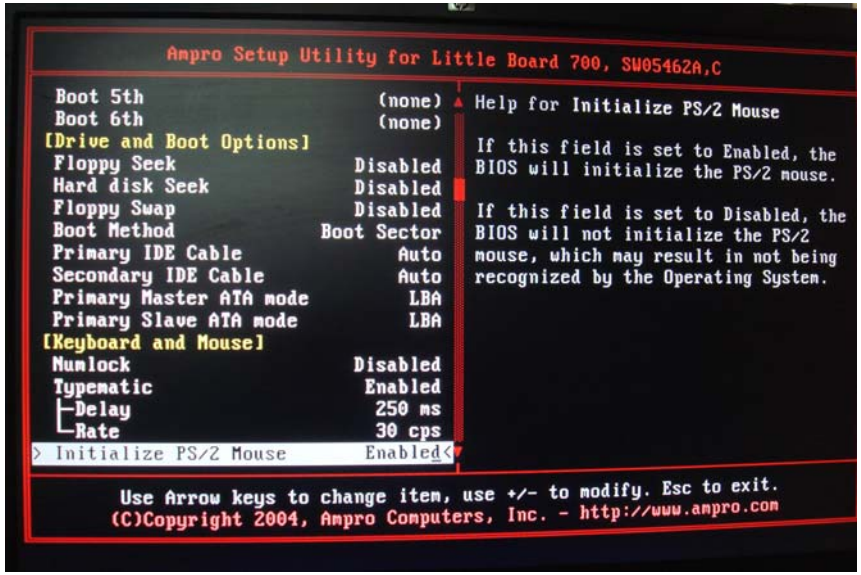
PC104 connectivity

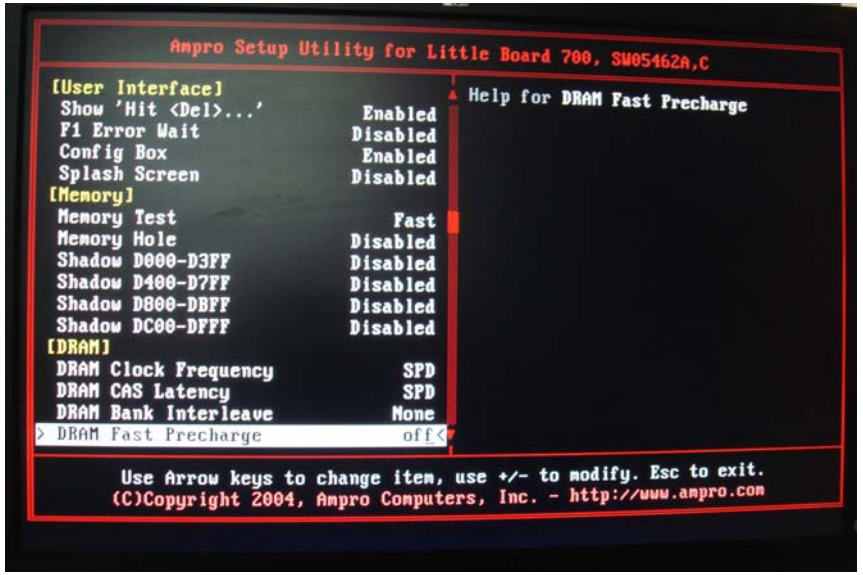
When installing a new AMPRO board, ensure that JP4 is inserted since this allows booting from the CF Flash disk.

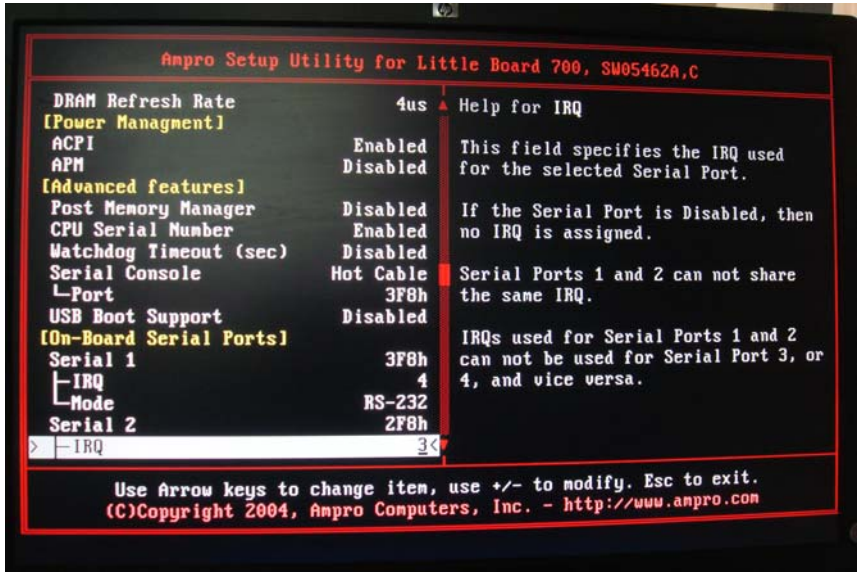
CMOS setup of the Ampro boards is as follows:

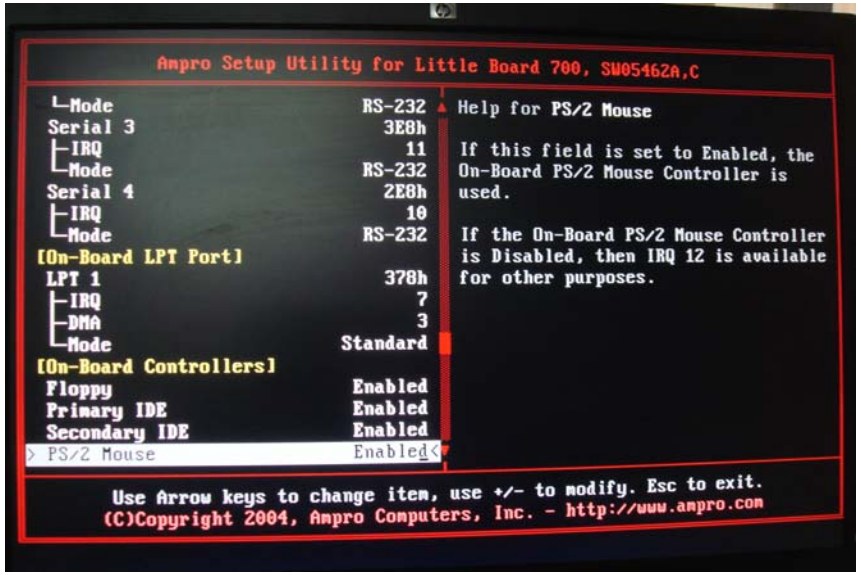
Ampro Setup Utility for Little Board 700, SW05462A,C
BIOS and Hardware Settings
Reload Initial Settings
Load Factory Default Settings
Exit, Saving Changes
Exit, Discarding Changes
Help for BIOS and Hardware Settings
This selection enters the screen with setup parameters.
These parameters configure the BIOS and the hardware, as well as peripheral devices.
Use Arrow keys to change menu item, use Enter to select menu item
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com

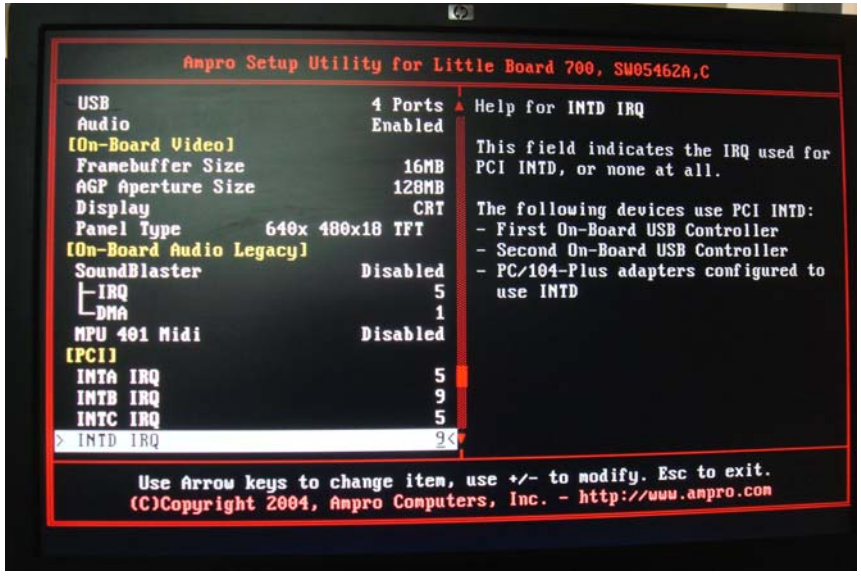

Ampro Setup Utility for Little Board 700, SW05462A,C
[Date & Time]
Date 31 Oct 2009
Time 01:31:11
[Drive Assignment]
Drive A 1.44 MB, 3.5"
Drive B (none)
Drive C HDD/CF on Pri Master
Drive D (none)
Drive E (none)
Drive F (none)
Drive G (none)
[Boot Order]
Boot 1st Drive A:
Boot 2nd Drive C:
Boot 3rd CDROM
Boot 4th (none)
Boot 5th (none)
Help for Drive A
Select the type of floppy drive attached to the cable. Select (none) if there is no floppy drive attached.
Use Arrow keys to change item, use +/- to modify. Esc to exit.
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com

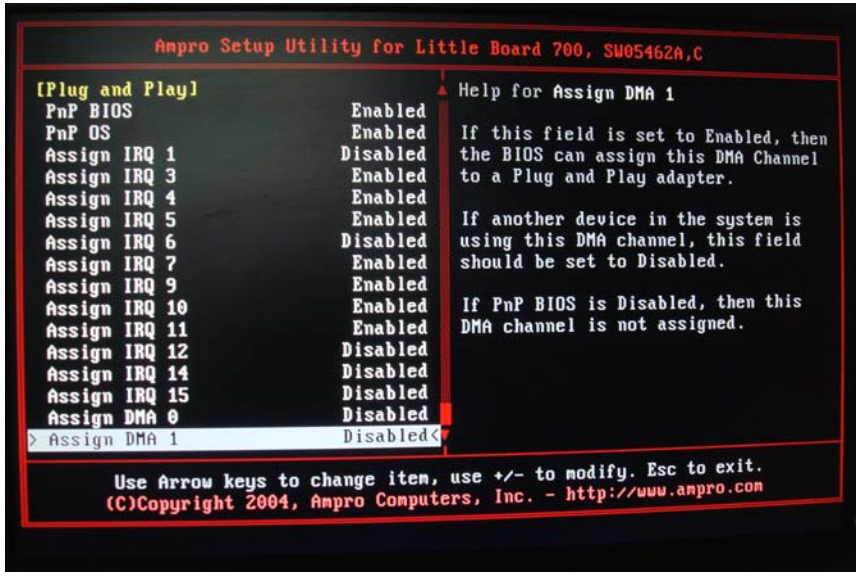

Ampro Setup Utility for Little Board 700, SW05462A,C
Boot 5th (none)
Boot 6th (none)
[Drive and Boot Options]
Floppy Seek Disabled
Hard disk Seek Disabled
Floppy Swap Disabled
Boot Method Boot Sector
Primary IDE Cable Auto
Secondary IDE Cable Auto
Primary Master ATA mode LBA
Primary Slave ATA mode LBA
[Keyboard and Mouse]
Numlock Disabled
Typematic Enabled
Delay 250 ms
Rate 30 cps
Initialize PS/2 Mouse Enabled
Help for Initialize PS/2 Mouse
If this field is set to Enabled, the BIOS will initialize the PS/2 mouse.
If this field is set to Disabled, the BIOS will not initialize the PS/2 mouse, which may result in not being recognized by the Operating System.
Use Arrow keys to change item, use +/- to modify. Esc to exit.
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com


Ampro Setup Utility for Little Board 700, SW05462A,C
[User Interface]
Show 'Hit <Del>...' Enabled
F1 Error Wait Disabled
Config Box Enabled
Splash Screen Disabled
[Memory]
Memory Test Fast
Memory Hole Disabled
Shadow D000-D3FF Disabled
Shadow D400-D7FF Disabled
Shadow D800-DBFF Disabled
Shadow DC00-DFFF Disabled
[DRAM]
DRAM Clock Frequency SPD
DRAM CAS Latency SPD
DRAM Bank Interleave None
DRAM Fast Precharge off
Help for DRAM Fast Precharge
Use Arrow keys to change item, use +/- to modify. Esc to exit.
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com


Ampro Setup Utility for Little Board 700, SW05462A,C
DRAM Refresh Rate 4us
[Power Managment]
ACPI Enabled
APM Disabled
[Advanced features]
Post Memory Manager Disabled
CPU Serial Number Enabled
Watchdog Timeout (sec) Disabled
Serial Console Hot Cable
└Port 3F8h
USB Boot Support Disabled
[On-Board Serial Ports]
Serial 1 3F8h
├IRQ 4
└Mode RS-232
Serial 2 2F8h
> ├IRQ 3<
Help for IRQ
This field specifies the IRQ used for the selected Serial Port.
If the Serial Port is Disabled, then no IRQ is assigned.
Serial Ports 1 and 2 can not share the same IRQ.
IRQs used for Serial Ports 1 and 2 can not be used for Serial Port 3, or 4, and vice versa.
Use Arrow keys to change item, use +/- to modify. Esc to exit.
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com


Ampro Setup Utility for Little Board 700, SW05462A,C
└Mode RS-232
Serial 3 3E8h
├IRQ 11
└Mode RS-232
Serial 4 2E8h
├IRQ 10
└Mode RS-232
[On-Board LPT Port]
LPT 1 378h
├IRQ 7
├DMA 3
└Mode Standard
[On-Board Controllers]
Floppy Enabled
Primary IDE Enabled
Secondary IDE Enabled
> PS/2 Mouse Enabled<
Help for PS/2 Mouse
If this field is set to Enabled, the On-Board PS/2 Mouse Controller is used.
If the On-Board PS/2 Mouse Controller is Disabled, then IRQ 12 is available for other purposes.
Use Arrow keys to change item, use +/- to modify. Esc to exit.
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com


Ampro Setup Utility for Little Board 700, SW05462A,C
USB 4 Ports
Audio Enabled
[On-Board Video]
Framebuffer Size 16MB
AGP Aperture Size 128MB
Display CRT
Panel Type 640x 480x18 TFT
[On-Board Audio Legacy]
SoundBlaster Disabled
├IRQ 5
└DMA 1
MPU 401 Midi Disabled
[PCI]
INTA IRQ 5
INTB IRQ 9
INTC IRQ 5
> INTD IRQ 9<
Help for INTD IRQ
This field indicates the IRQ used for PCI INTD, or none at all.
The following devices use PCI INTD:
- First On-Board USB Controller
- Second On-Board USB Controller
- PC/104-Plus adapters configured to use INTD
Use Arrow keys to change item, use +/- to modify. Esc to exit.
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com


Ampro Setup Utility for Little Board 700, SW05462A,C
[Plug and Play]
PnP BIOS Enabled
PnP OS Enabled
Assign IRQ 1 Disabled
Assign IRQ 3 Enabled
Assign IRQ 4 Enabled
Assign IRQ 5 Enabled
Assign IRQ 6 Disabled
Assign IRQ 7 Enabled
Assign IRQ 9 Enabled
Assign IRQ 10 Enabled
Assign IRQ 11 Enabled
Assign IRQ 12 Disabled
Assign IRQ 14 Disabled
Assign IRQ 15 Disabled
Assign DMA 0 Disabled
> Assign DMA 1 Disabled<
Help for Assign DMA 1
If this field is set to Enabled, then the BIOS can assign this DMA Channel to a Plug and Play adapter.
If another device in the system is using this DMA channel, this field should be set to Disabled.
If PnP BIOS is Disabled, then this DMA channel is not assigned.
Use Arrow keys to change item, use +/- to modify. Esc to exit.
(C)Copyright 2004, Ampro Computers, Inc. - http://www.ampro.com

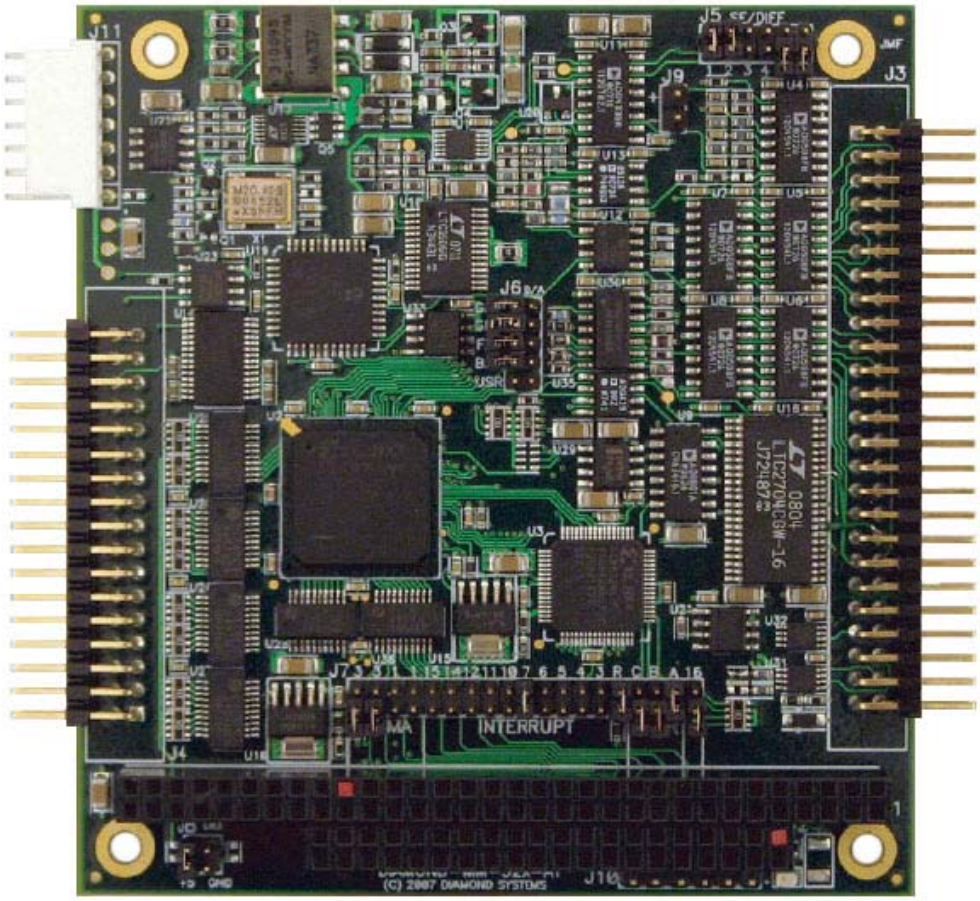
4.7 DIAMOND DMM32 BOARD

The Diamond DMM-32DX-AT Board has a PC-104 format. It plugs directly into the AMPRO Little Board Computer.

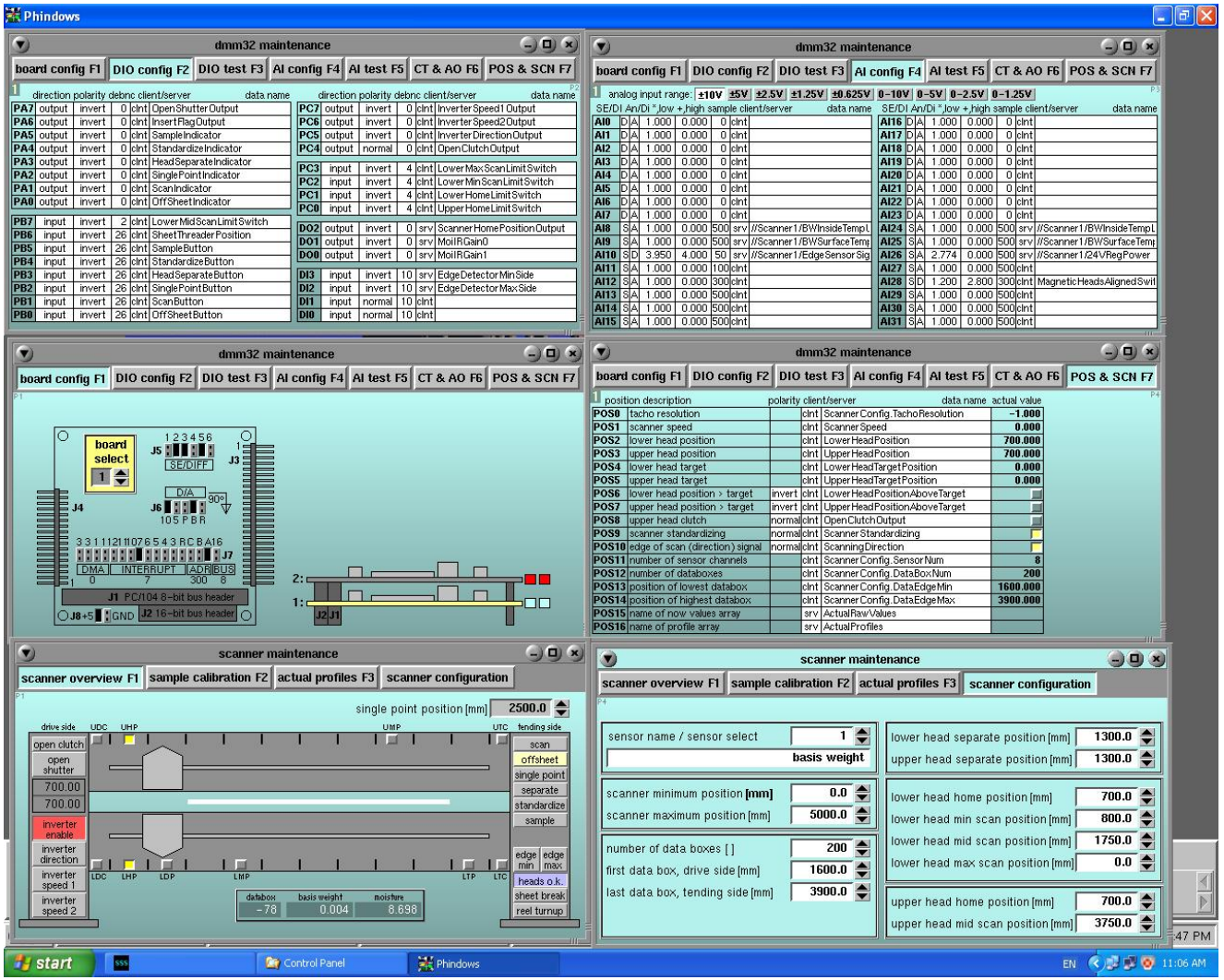
The DMM32 has the capability of up to 32 Analog Inputs and 31 digital I/O.

Two ribbon cables are connected to the connectors of this board. A 50 way ribbon connects the DMM32 to the Analog Input Termination Board. A 32 way ribbon connects the DMM32 to the Digital I/O and Tacho Termination boards.

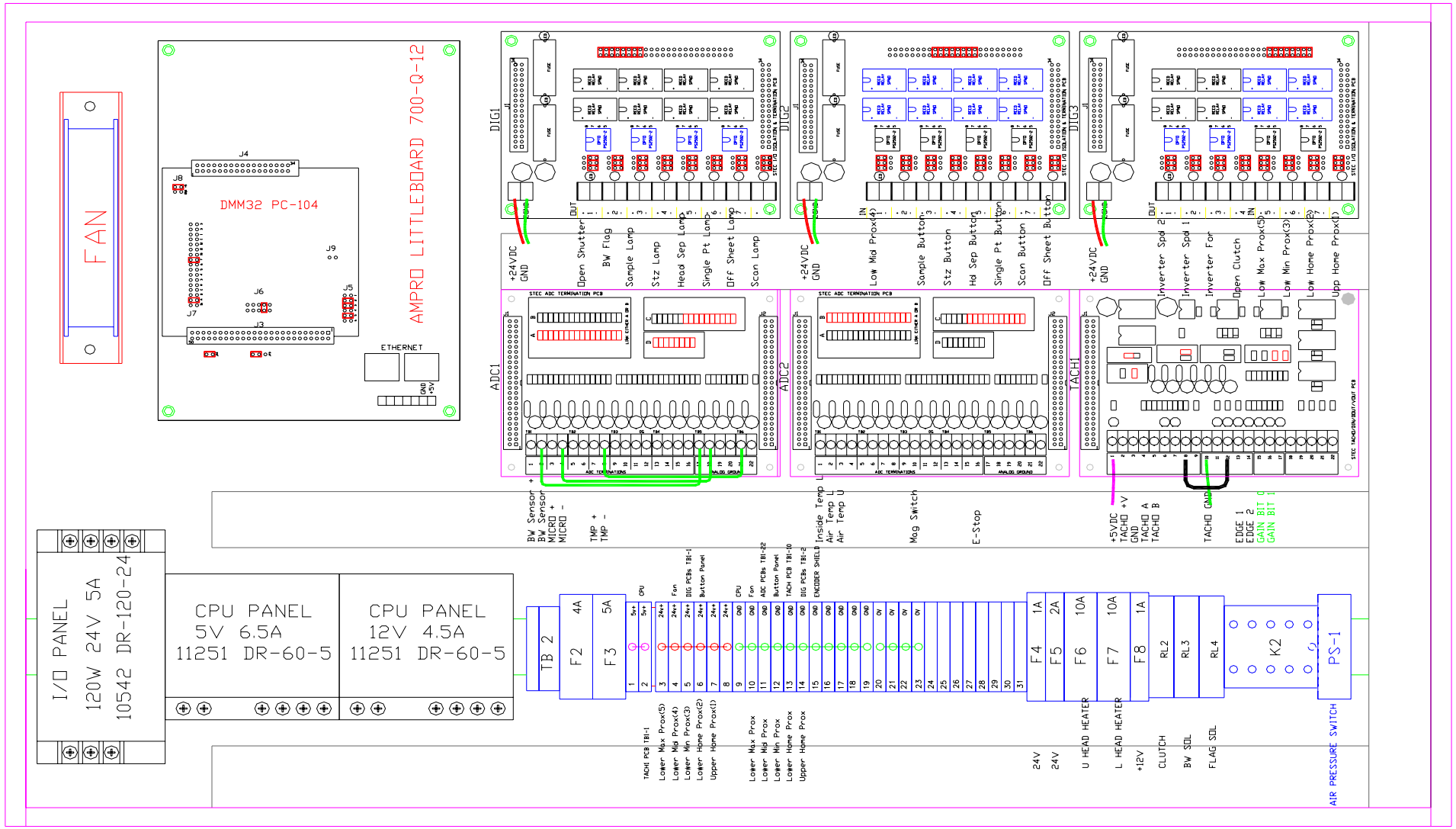
Links on the board provide addressing, interrupt, pull-up/down and I/O configurations setup. If the board is replaced it is essential that these link configuration be replicated on the new board.

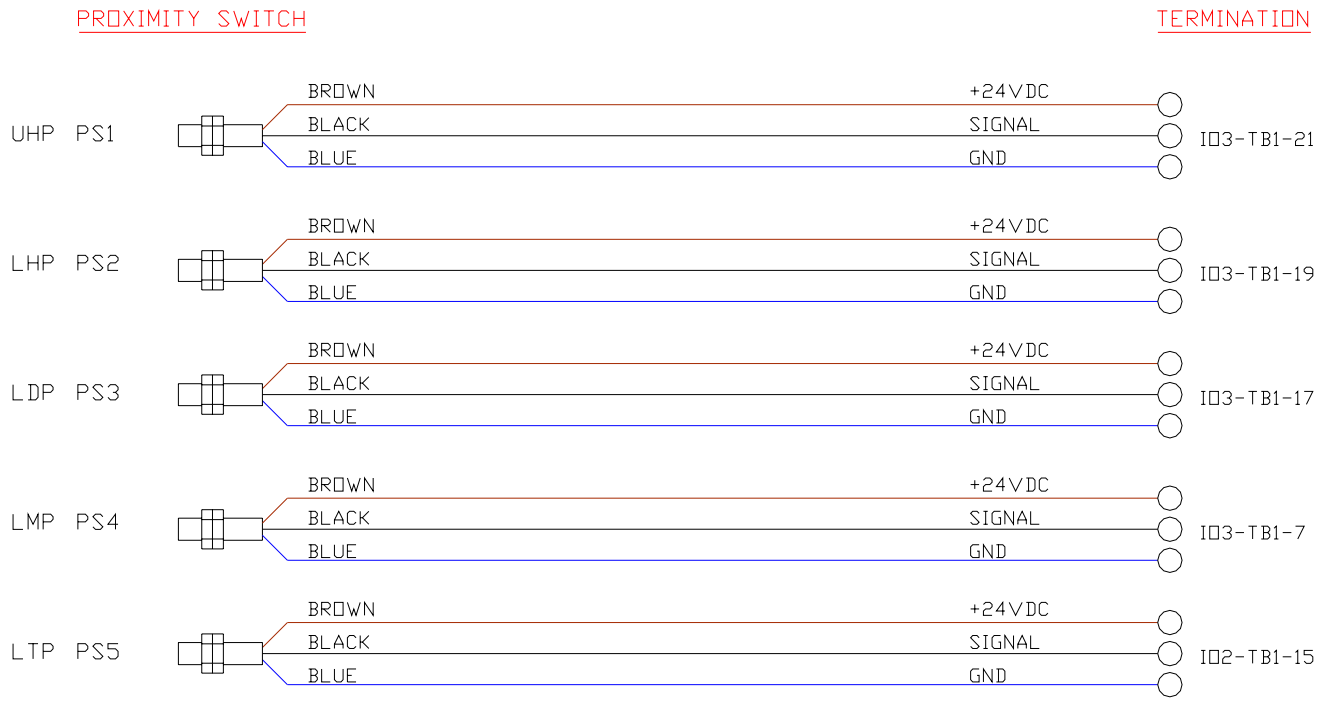


DMM-32 SETUP - example



SCANNER COMPUTER ENCLOSURE LAYOUT





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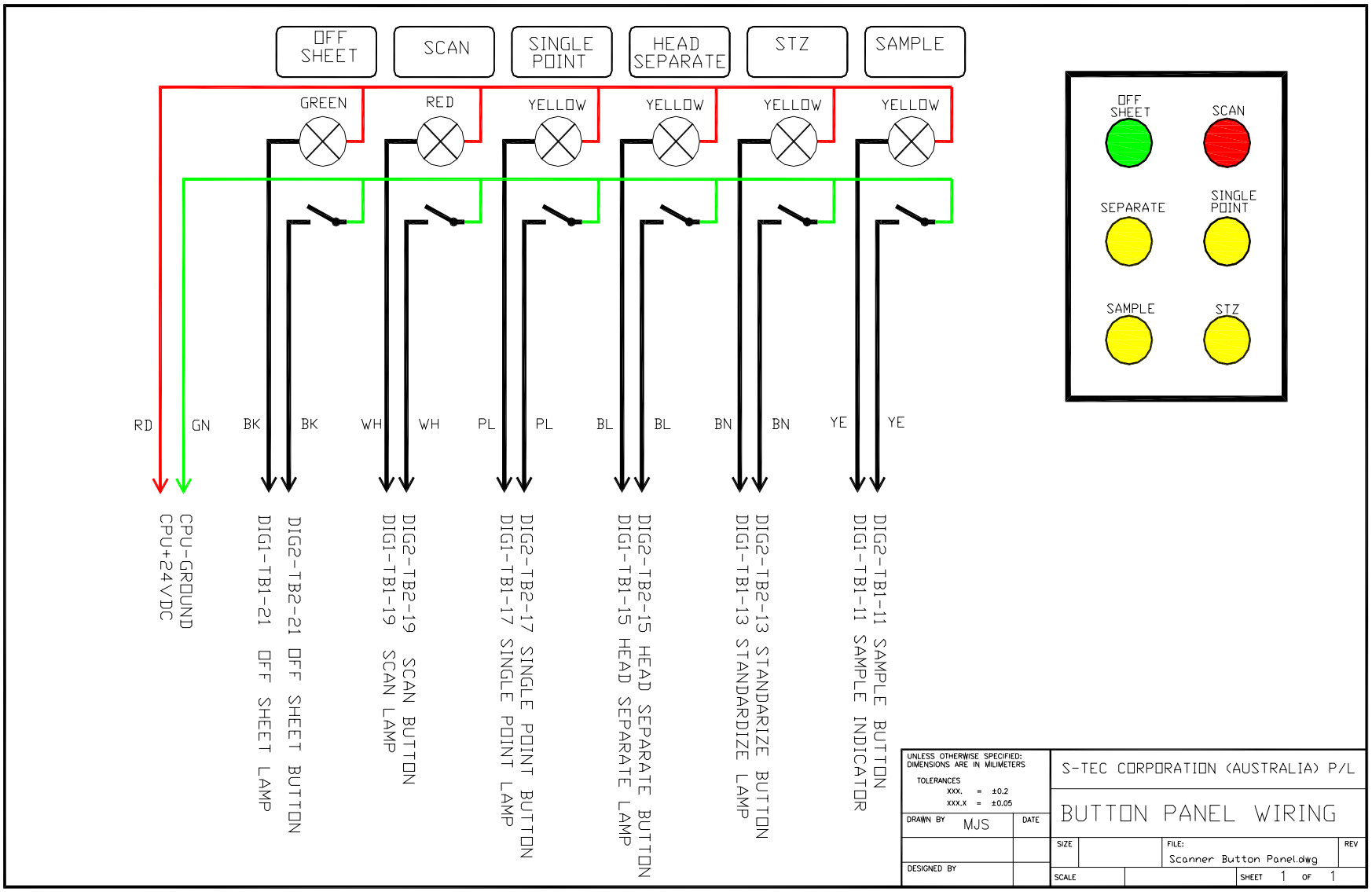
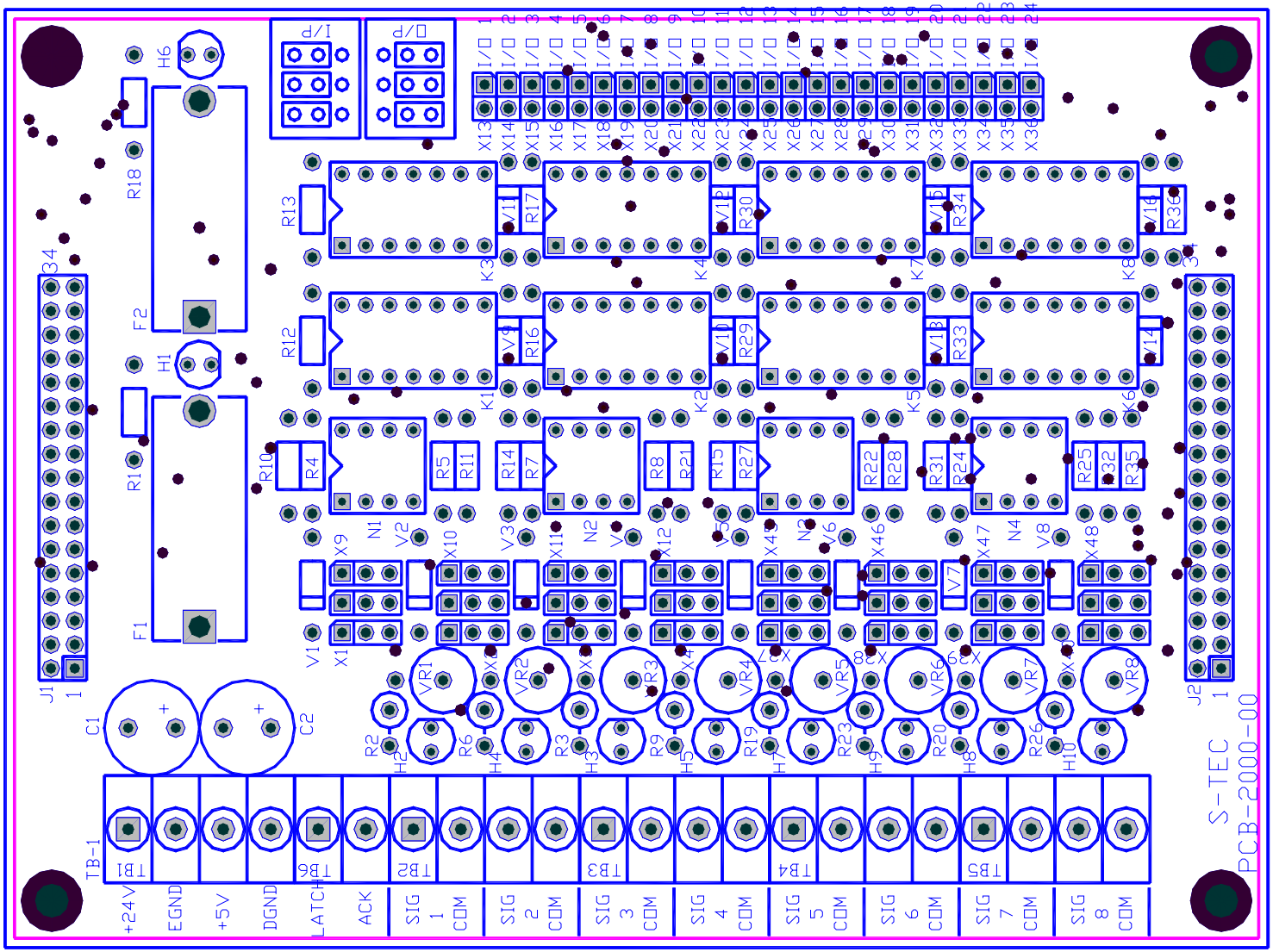
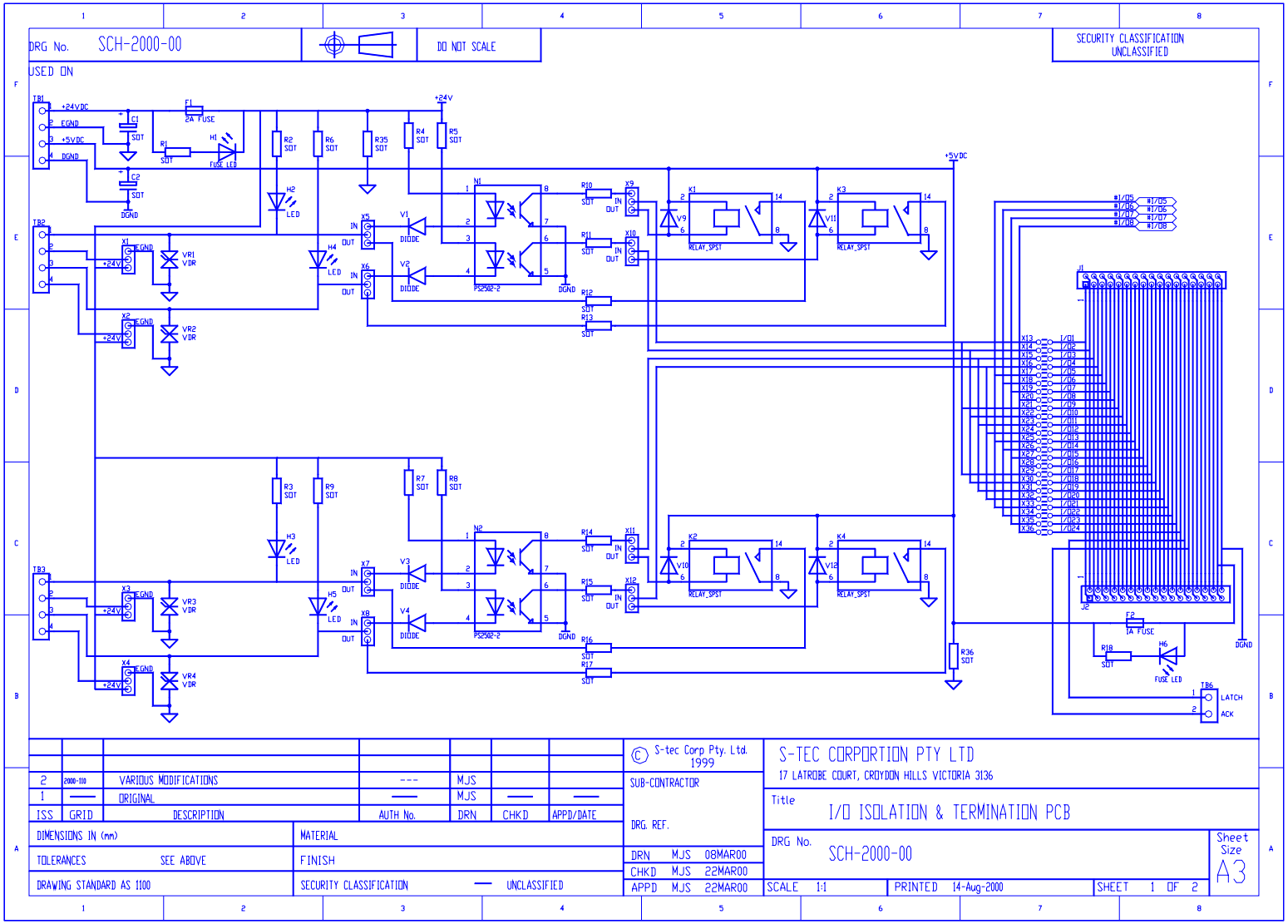
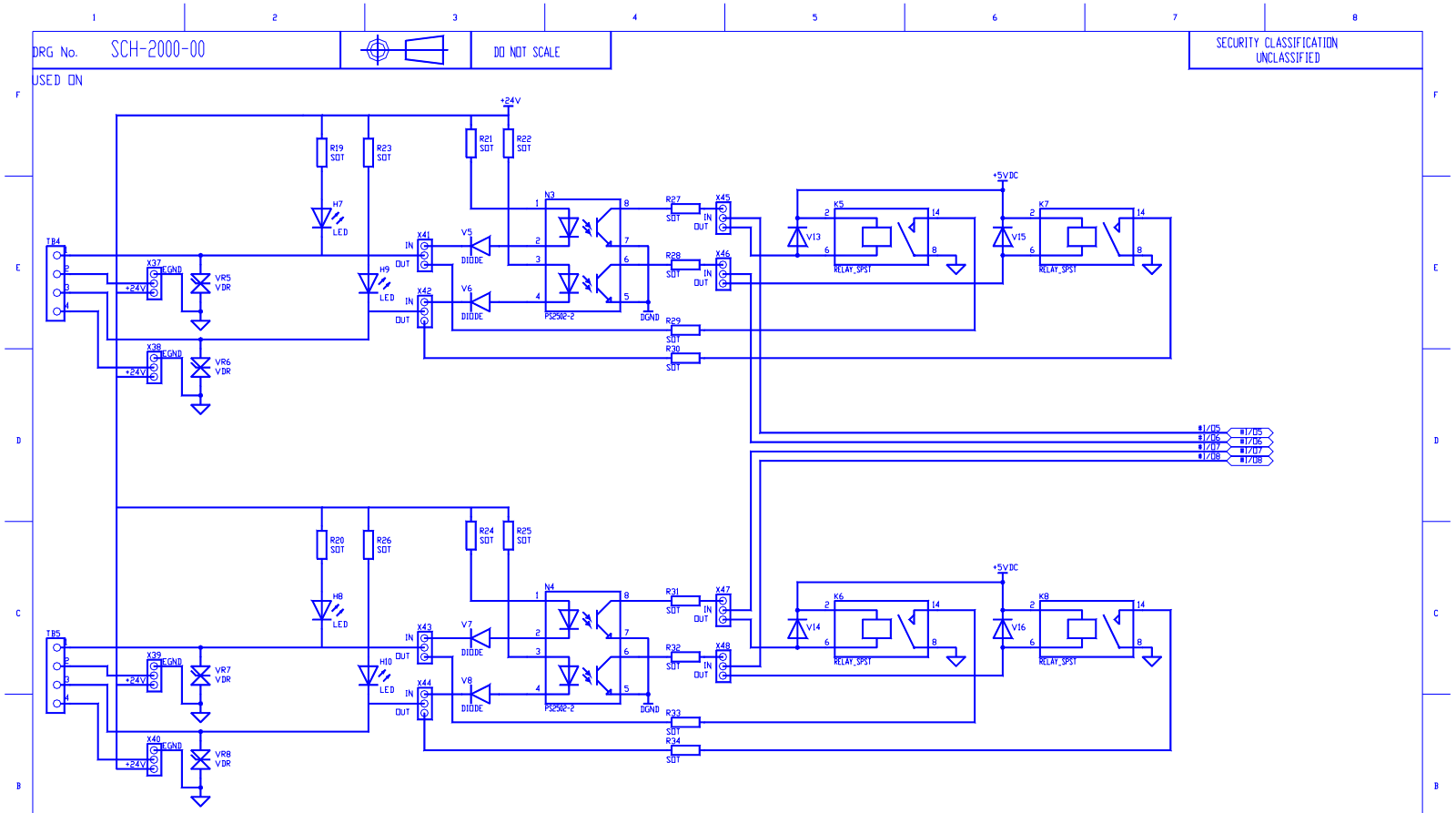
UNITS	METRIC	CHECKED BY:	XXX	PROJECT NUMBER		
DRWG SIZE:	A4 / A3	APPROVED BY:	XXX	FILE NAME		


OFF SHEET
SCAN
SINGLE POINT
HEAD SEPARATE
STZ
SAMPLE
GREEN
RED
YELLOW
YELLOW
YELLOW
YELLOW
RD
GN
BK
BK
WH
WH
PL
PL
BL
BL
BN
BN
YE
YE
CPU-GROUND
CPU+24VDC
DIG1-TB1-21 OFF SHEET LAMP
DIG2-TB2-21 OFF SHEET BUTTON
DIG1-TB1-19 SCAN LAMP
DIG2-TB2-19 SCAN BUTTON
DIG1-TB1-17 SINGLE POINT LAMP
DIG2-TB2-17 SINGLE POINT BUTTON
DIG1-TB1-15 HEAD SEPARATE LAMP
DIG2-TB2-15 HEAD SEPARATE BUTTON
DIG1-TB1-13 STANDARDIZE LAMP
DIG2-TB2-13 STANDARIZE BUTTON
DIG1-TB1-11 SAMPLE INDICATOR
DIG2-TB1-11 SAMPLE BUTTON
OFF SHEET
SCAN
SEPARATE
SINGLE POINT
SAMPLE
STZ
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILIMETERS
TOLERANCES
XXX. = ±0.2
XXX.X = ±0.05
DRAWN BY MJS
DATE
DESIGNED BY
S-TEC CORPORATION (AUSTRALIA) P/L
BUTTON PANEL WIRING
SIZE
FILE: Scanner Button Panel.dwg
REV
SCALE
SHEET 1 OF 1


S-TEC
PCB-2000-00
TB-1
+24V
EGND
+5V
DGND
LATCH
ACK
SIG 1
SIG 2
SIG 3
SIG 4
SIG 5
SIG 6
SIG 7
SIG 8
COM


DRG No. SCH-2000-00
DO NOT SCALE
SECURITY CLASSIFICATION
UNCLASSIFIED
USED ON
+24VDC
EGND
+5VDC
DGND
F1
2A FUSE
FUSE LED
LED
DIODE
PS2502-2
RELAY_SPST
VDR
+24V
+5VDC
I/O1
I/O2
I/O3
I/O4
I/O5
I/O6
I/O7
I/O8
F2
1A FUSE
LATCH
ACK
© S-tec Corp Pty. Ltd. 1999
SUB-CONTRACTOR
DRG. REF.
S-TEC CORPORTION PTY LTD
17 LATROBE COURT, CROYDON HILLS VICTORIA 3136
Title
I/O ISOLATION & TERMINATION PCB
DRG No.
SCH-2000-00
Sheet Size
A3
2 2000-110 VARIOUS MODIFICATIONS --- MJS
1 — ORIGINAL — MJS — —
ISS GRID DESCRIPTION AUTH No. DRN CHK'D APPD/DATE
DIMENSIONS IN (mm)
TOLERANCES SEE ABOVE
DRAWING STANDARD AS 1100
MATERIAL
FINISH
SECURITY CLASSIFICATION — UNCLASSIFIED
DRN MJS 08MAR00
CHK'D MJS 22MAR00
APP'D MJS 22MAR00
SCALE 1:1
PRINTED 14-Aug-2000
SHEET 1 OF 2



ISS	GRID	DESCRIPTION	AUTH No.	DRN	CHKD	APPD/DATE
2	2000-110	VARIOUS MODIFICATIONS	---	MJS		
1	—	ORIGINAL	—	MJS	—	—

© S-tec Corp Pty. Ltd. 1999

SUB-CONTRACTOR

DRG. REF.

DRN	MJS	08MAR00
CHKD	MJS	22MAR00
APPD	MJS	22MAR00

DIMENSIONS IN (mm)

TOLERANCES SEE ABOVE

DRAWING STANDARD AS 1100

MATERIAL

FINISH

SECURITY CLASSIFICATION — UNCLASSIFIED

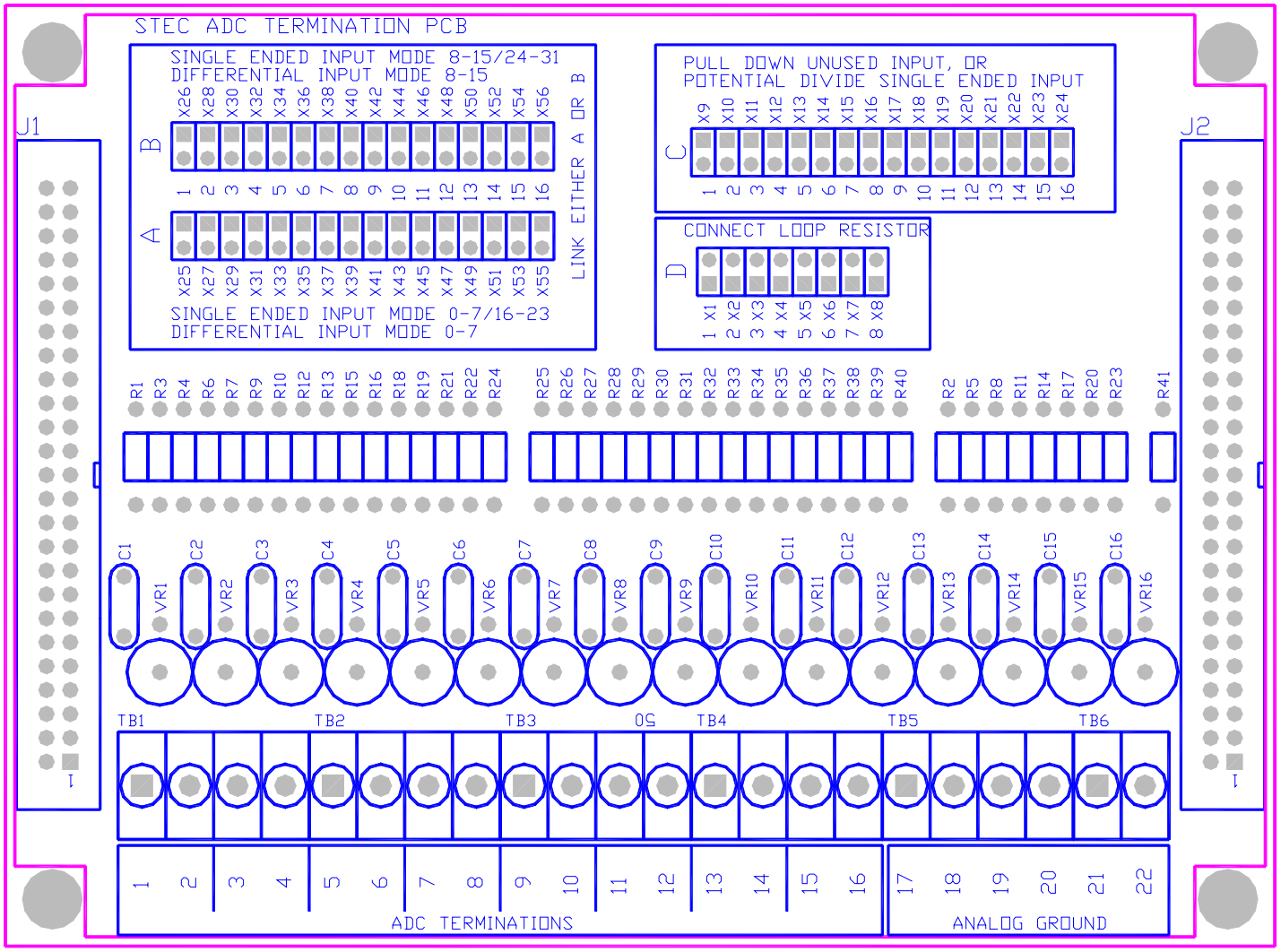
S-TEC CORPORTION PTY LTD
17 LATROBE COURT, CROYDON HILLS VICTORIA 3136

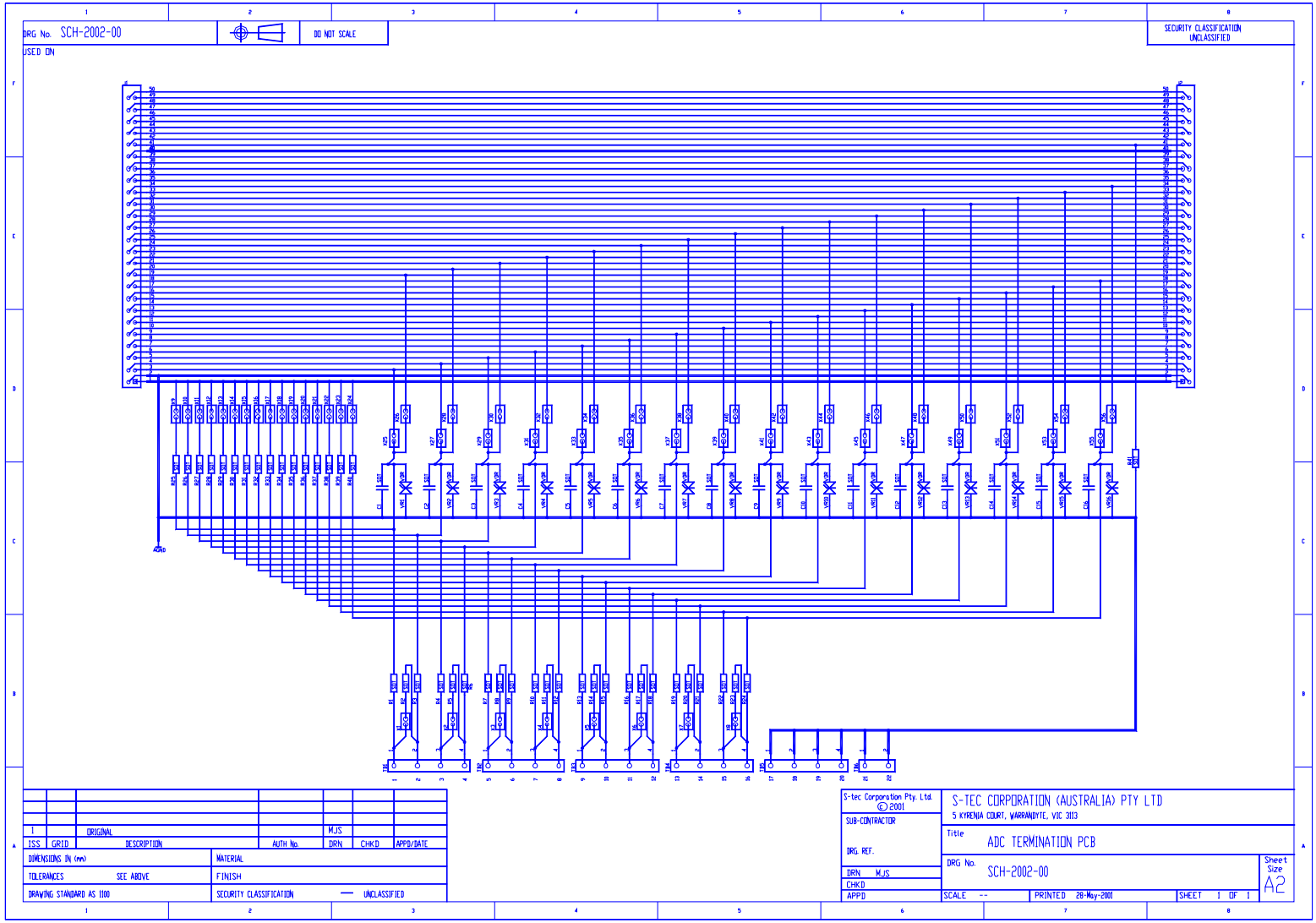
Title: I/O ISOLATION & TERMINATION PCB

DRG No. SCH-2000-00

Sheet Size A3

SCALE 1:1 | PRINTED 14-Aug-2000 | SHEET 2 OF 2


STEC ADC TERMINATION PCB
SINGLE ENDED INPUT MODE 8-15/24-31
DIFFERENTIAL INPUT MODE 8-15
B
X26 X28 X30 X32 X34 X36 X38 X40 X42 X44 X46 X48 X50 X52 X54 X56
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A
X25 X27 X29 X31 X33 X35 X37 X39 X41 X43 X45 X47 X49 X51 X53 X55
LINK EITHER A OR B
SINGLE ENDED INPUT MODE 0-7/16-23
DIFFERENTIAL INPUT MODE 0-7
PULL DOWN UNUSED INPUT, OR
POTENTIAL DIVIDE SINGLE ENDED INPUT
C
X9 X10 X11 X12 X13 X14 X15 X16 X17 X18 X19 X20 X21 X22 X23 X24
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
CONNECT LOOP RESISTOR
D
1 X1 2 X2 3 X3 4 X4 5 X5 6 X6 7 X7 8 X8
J1
J2
R1 R3 R4 R6 R7 R9 R10 R12 R13 R15 R16 R18 R19 R21 R22 R24
R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36 R37 R38 R39 R40
R2 R5 R8 R11 R14 R17 R20 R23
R41
C1 VR1 C2 VR2 C3 VR3 C4 VR4 C5 VR5 C6 VR6 C7 VR7 C8 VR8 C9 VR9 C10 VR10 C11 VR11 C12 VR12 C13 VR13 C14 VR14 C15 VR15 C16 VR16
TB1 TB2 TB3 TB4 TB5 TB6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
ADC TERMINATIONS
17 18 19 20 21 22
ANALOG GROUND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SECURITY CLASSIFICATION — UNCLASSIFIED
S-tec Corporation Pty. Ltd. © 2001
SUB-CONTRACTOR
DRG. REF.
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CHKD
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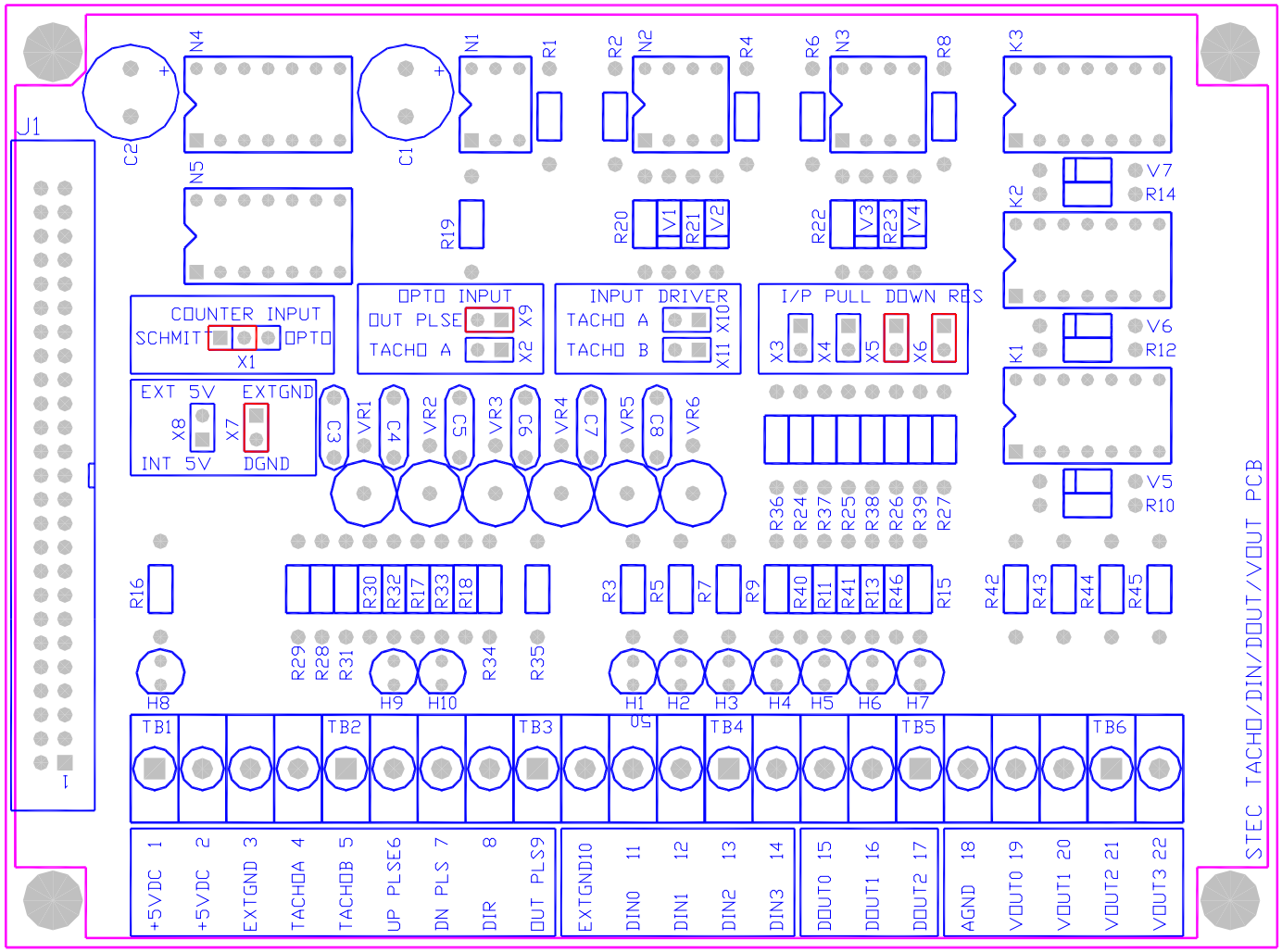
J1
C2
C1
N4
N5
N1
N2
N3
K3
K2
K1
R1
R2
R4
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R8
R19
R20
R22
V1
V2
V3
V4
V7
R14
V6
R12
V5
R10
COUNTER INPUT
SCHMIT
OPTO
X1
OPTO INPUT
OUT PLSE
TACHO A
X9
X2
INPUT DRIVER
TACHO A
TACHO B
X10
X11
I/P PULL DOWN RES
X3
X4
X5
X6
EXT 5V
EXTGND
X8
X7
INT 5V
DGND
C3
VR1
C4
VR2
C5
VR3
C6
VR4
C7
VR5
C8
VR6
R36
R24
R37
R25
R38
R26
R39
R27
R16
R30
R32
R17
R33
R18
R3
R5
R7
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R45
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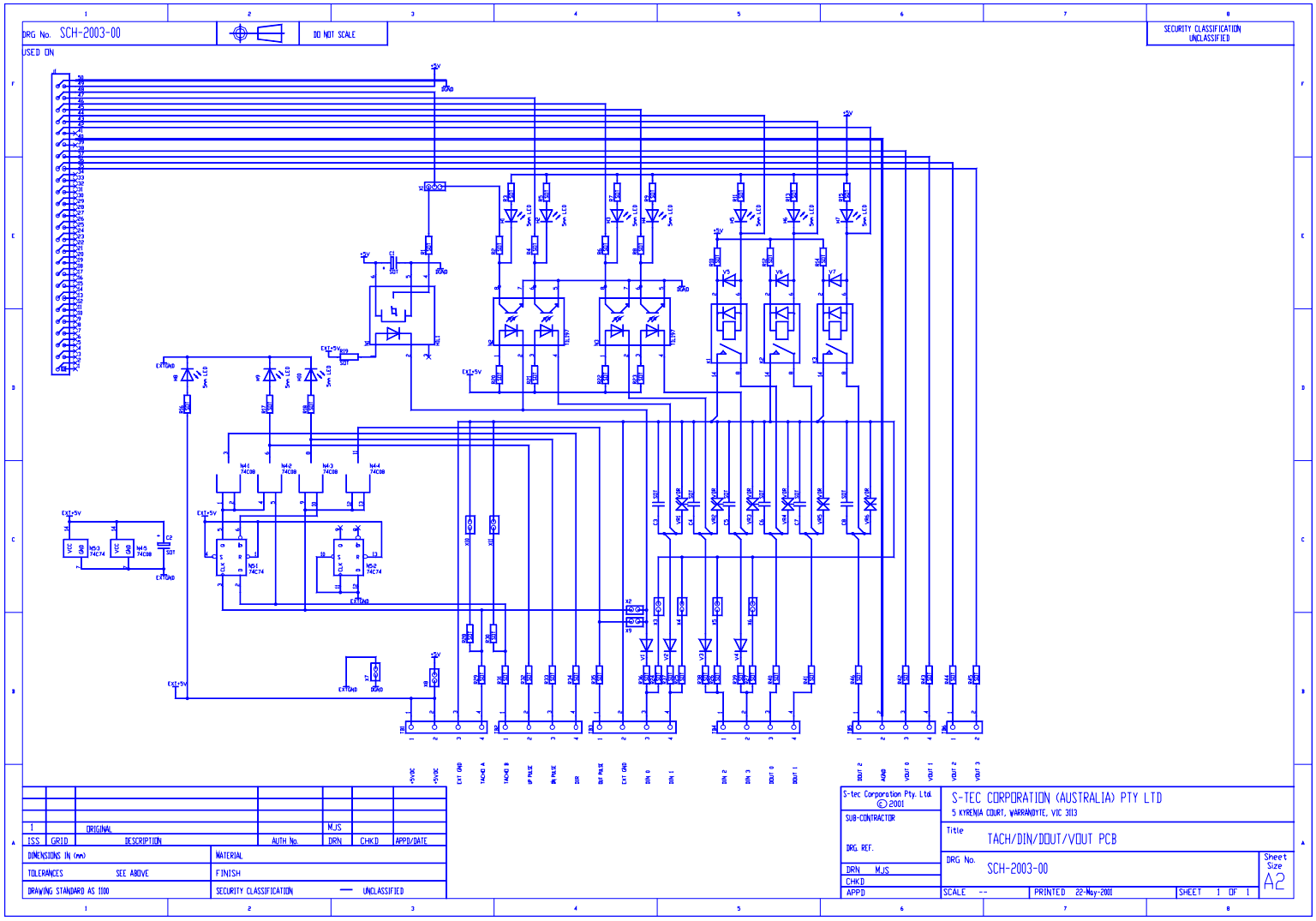
R28
R31
R34
R35
H8
H9
H10
H1
H2
H3
H4
H5
H6
H7
TB1
TB2
TB3
TB4
TB5
TB6
+5VDC 1
+5VDC 2
EXTGND 3
TACHOA 4
TACHOB 5
UP PLSE6
DN PLS 7
DIR 8
OUT PLS9
EXTGNDIO
DIN0 11
DIN1 12
DIN2 13
DIN3 14
DOUT0 15
DOUT1 16
DOUT2 17
AGND 18
VOUT0 19
VOUT1 20
VOUT2 21
VOUT3 22
STEC TACHO/DIN/DOUT/VOUT PCB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TACHO A
TACHO B
DP PULSE
DM PULSE
DIR
DAT PULSE
EXT GND
DIN 0
DIN 1
DIN 2
DIN 3
DOUT 0
DOUT 1
DOUT 2
AGND
VOUT 0
VOUT 1
VOUT 2
VOUT 3
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CHKD
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SEE ABOVE
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PRINTED 22-May-2001
SHEET 1 OF 1

CHAPTER 5

SCANNER MAINTENANCE

CHAPTER 5

5.0 MAINTENANCE

5.1 TROUBLE-SHOOTING

Maintenance of the S-TEC Measurement and Control System is straightforward. The System can be separated into 3 general categories:

1) The Sensor Heads which include the Sensors.

2) The Electrical/Electronic items.

3) The Scanner Drive mechanism.

Should any problem arise from the system, the first thing to do is to identify which of the above categories the problem belongs to. Once this is identified, the component causing the problem should be very easy to find.

For problems associated with the Sensor Heads and Sensors the appropriate Manuals should be referred to. For problems associated with the Electrical/Electronic items and the Scanner Drive mechanism, refer to the Drawings and the descriptions included in the previous chapters of this Manual.

5.2 SCANNER DRIVE MECHANISM MAINTENANCE

The only category that has large sized mechanical moving parts that require servicing is the Scanner Drive mechanism. This servicing is made very simple because all the parts are readily accessible.

GREASING:

It is necessary to do some routine greasing on some of the moving parts of the Scanner Drive system. The mechanical moving parts of the Scanner Drive system consists mainly of the 3∅ motor and gearbox, the drive shaft and its bearings, the linear bearings that carry the Sensors and move along the round rails.

The Motor &gearbox and the Drive shaft bearings are all housed in the Drive side end-bell. There are 3 greasing points here, one on the gearbox, one on each of the two bearings that holds the Drive shaft. IT IS NECESSARY TO ADD GREASE AT THESE GREASING POINTS EVERY 6 MONTH INTERVAL. Adding grease is easy through use of a normal Greasing gun. It is recommended that the Grease used is at least of the quality of multi-purpose Lithium Grease.

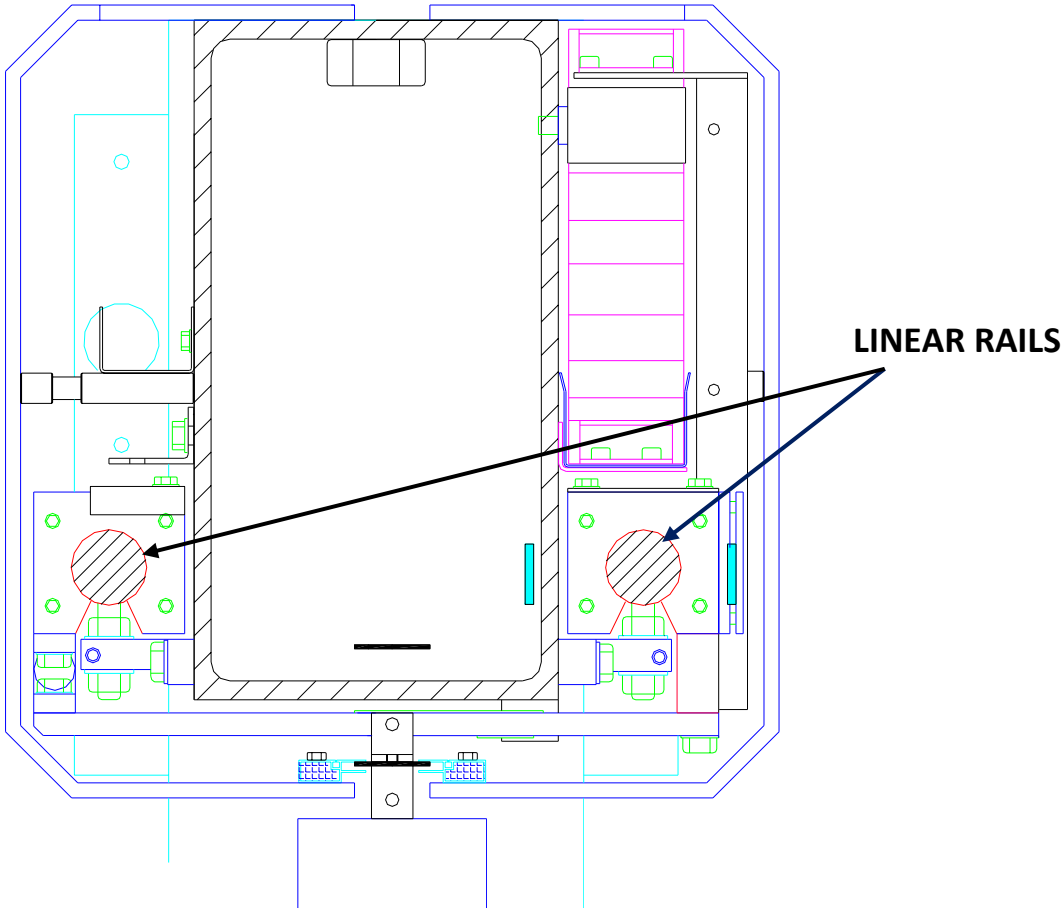
The round rails along which the Linear bearings run also requires greasing. These rails are mounted on the upper and lower double I-Beams on the right side of the Scanner Frame looking from the Tend (Operator station) side. IT IS RECOMMENDED THAT THIS GREASING BE DONE EVERY 3 MONTHS.

Firstly, both the upper and lower rail stainless steel covers must be removed to reveal the round rails that the Linear Bearings run along as the Scanner is scanning across the sheet. These rails should be wiped clean from the previous old grease.

There are 2 linear bearings on the round rail on one side and one on the other side of both the upper and lower beams. The space between the two bearings must be cleaned as well. Once the rails are wiped clean, a new thin layer of multi-purpose Lithium grease is applied throughout the whole length of the rail. A thicker layer of grease should be applied on the space between the two bearings. Once this thicker layer of grease has been applied, the Sensor Heads can be scnnerd. Every year remove the linear baring housings, one at a time, clean and repack with Lithium grease.

SCANNER RAILS

Cross Section View



It is also recommended that the Scanner Drive mechanism is checked periodically for normal operation. Checks should be made for any unusual noises, motor temperature, belt tension, belt condition, smooth traverse of the linear bearings.

The drive mechanism components should all be wiped clean periodically.

BELT TENSION ADJUSTMENT

There are 2 types of belts used in the Scanner Drive mechanism. One type is for the Upper and Lower Sensor Heads Drive Belts and the second type is the Seal Belts for the upper and lower beam. There are thus a total of 4 belts in the scanner.

The type of belt used for driving the Sensor Heads across the sheet is steel reinforced polyurethane timing belt, 32mm wide, with 10mm pitch (T10 OR 8mm pitch). This belt is of very high quality and very tough with minimum stretch so will not cause misalignment of the sensor heads. The tension of this belt is adjusted by four bolts that hold the belt pulleys located at the front end of the Scanner Frame.

he correct tension is achieved by estimation and is not critical but the upper and lower belts must be similarly tensioned. Tension is estimated by pushing the belt at a position well away from the heads and end pulleys so that it is free to deflect. If it can easily be deflected only about 10mm then the tension is about right.

The third type of belt is the Sealing Belt. These Belts seals the Scanner beams from external influences along the length of the Scanner. The tension adjustment for these belts is located inside the Drive side end-bell of the Scanner Frame. Tightening the nuts increases the tension of the seal belts. The correct tension is achieved by observing the behaviour of the belts as the Sensor Heads scans. As long as the belts move smoothly and without causing any unusual noise, the tension is considered OK. They should not be over tightened.

SENSOR HEADS

Sensors and Sensor Head maintenance is described in the Sensors and Sensor Head Service Manuals. Periodic inspection is recommended to check for dirt build-up and condition of the Sensor windows. The S-TEC Sensor Heads can be separated automatically.

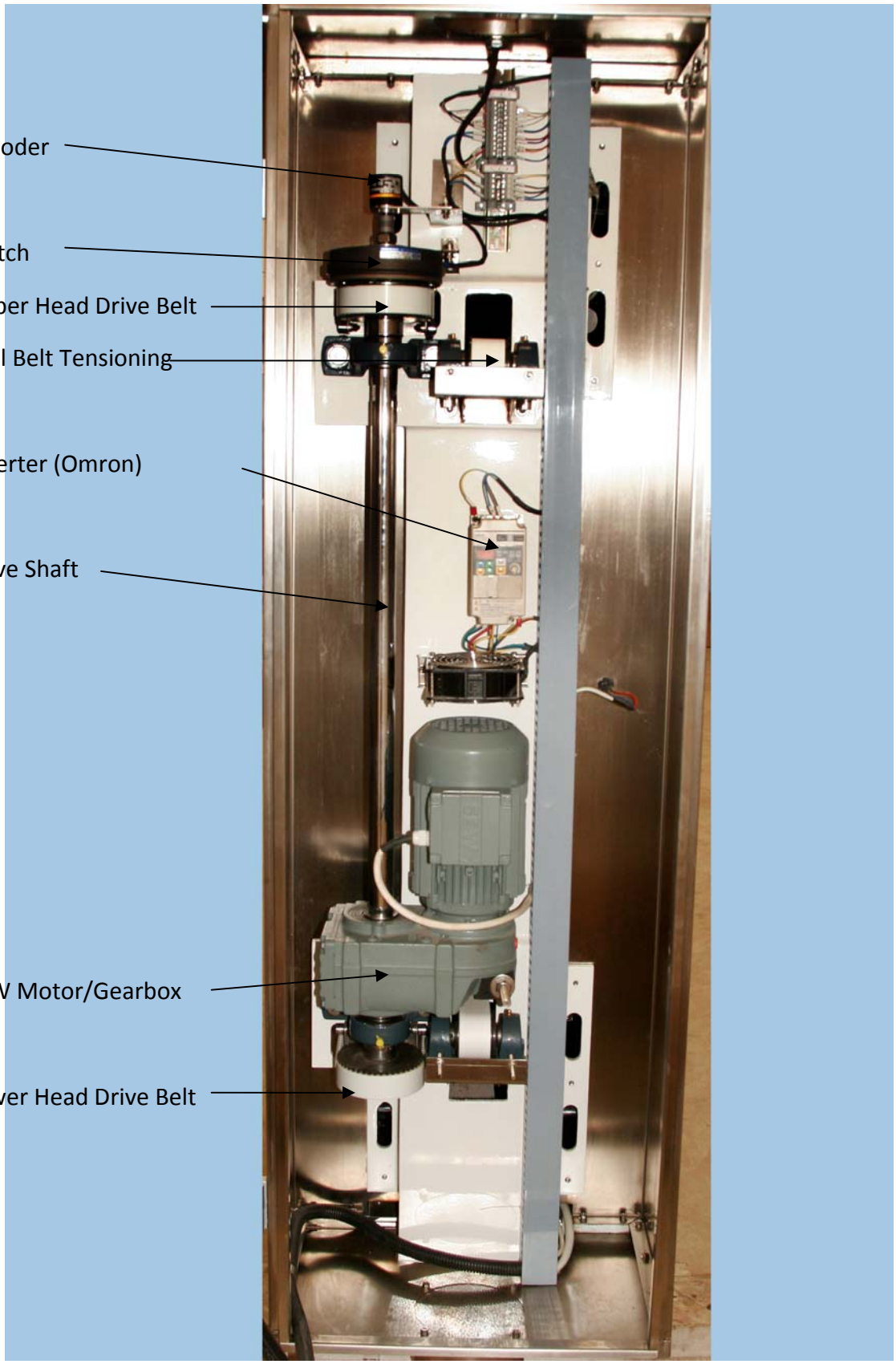
This is achieved by pressing the "Head Separate" push-button on the tending side of the scanner when the Sensor Heads are in the Off-sheet (home) position. This function first moves the upper head away from the lower head so that the lower head sensor windows can be cleaned and inspected.

Pressing the button one more time will move the upper head back to the home position and move the lower head out so that the windows on the upper head can be clean and inspected.

Pressing the button repeatedly will alternate between these two states.

Pressing the Off Sheet will cause the heads to be realigned. This takes a few minutes.

DRIVE MECHANISM COMPONENTS (DRIVE SIDE ENCLOSURE)

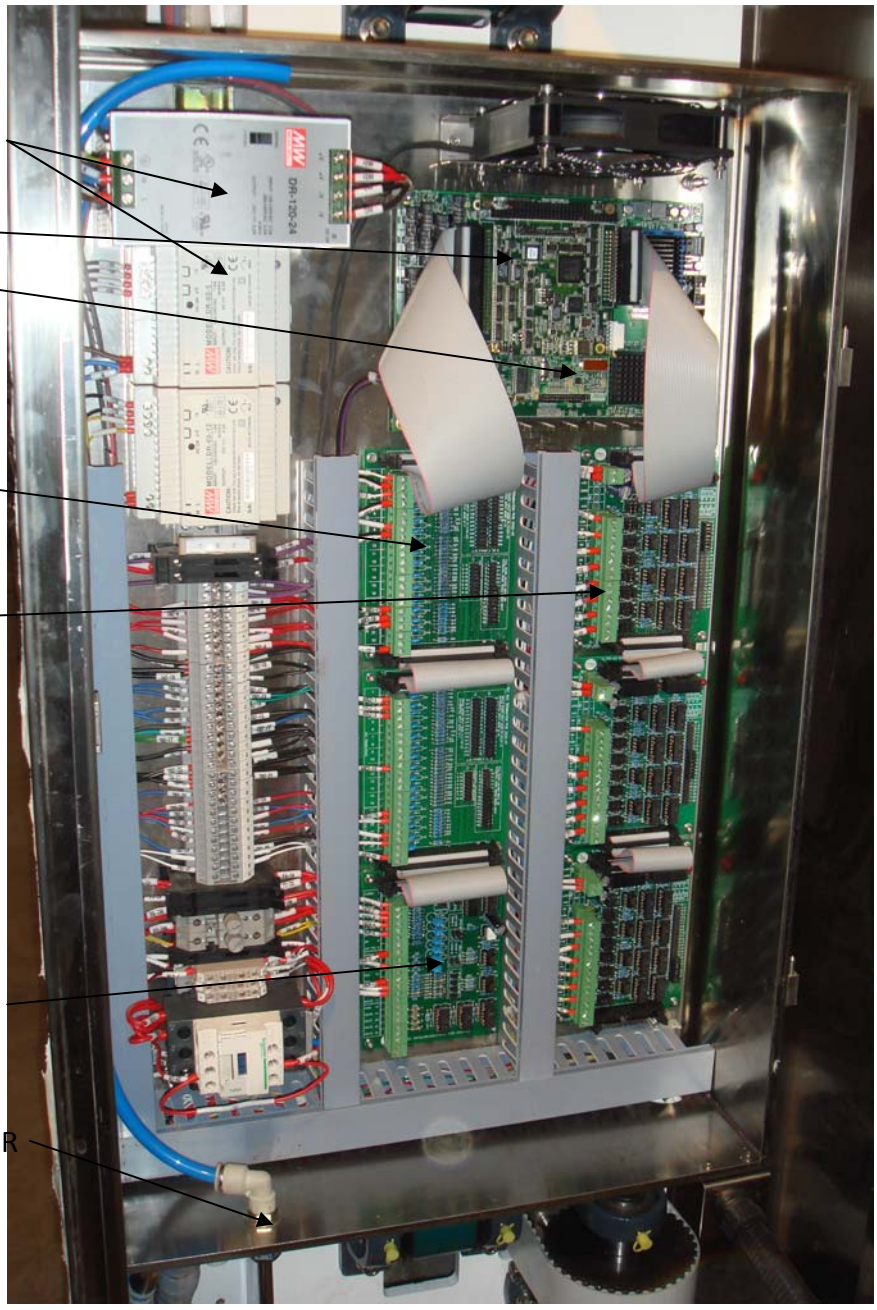


SCANNER COMPUTER ENCLOSURE

Ensure the enclosure cover is always on to protect against the entry of dirt. Periodically clean the blades of the fan and blow any accumulated dust from the computer boards.

Check proper cooling of the enclosure by the Vortex Cooler and ensure the Vortex Cooler has an adequate compressed air supply pressure and is optimally adjusted.

Check that there is no condensation inside the computer enclosure.



Planned Maintenance Schedule

1. **Daily Maintenance**
    a. Simple check of the system to ensure there are no obvious problems.
        i. Scanner Radiation warning lights are lit.
        ii. Scanner is scanning normally
        iii. Head is clean (if necessary clean).
        iv. Ask the Operators if everything is OK.

2. **Weekly Maintenance (in addition to the daily maintenance above)**
    a. Clean the sensor heads
    b. Separate the sensor heads and clean the sensor windows.
    c. Check windows for signs of damage.
    d. Realign and check for proper head alignment.
    e. Open the upper and lower head covers and check inside
        i. Check to ensure the vortex cooling is working.
        ii. Check to ensure the sensors are not too hot (less than 40 Deg C is normal).
        iii. Check to ensure the IR Moisture sensor lamp is functioning.
        iv. Check for anything loose or unusual.
        v. Check to make sure all the fans are working.
    f. Clean dust/dirt from end enclosures.
    g. Visually inspect the motor/gearbox/inverter/encoder/clutch for correct operation.
    h. Check to ensure that the scanner computer enclosure is clean and the vortex cooling is working.
    i. Check and log the compressed air pressure at the scanner air regulator.
    j. Log the Standardization values. Note any unusual deviations.
    k. Measure the standard Basis Weight samples and log along with the calibration data.
    l. Check the scanner operating buttons/lamps are functional.
    m. Clean and polish the scanner stainless steel covers.

3. **Monthly Maintenance (in addition to the weekly maintenance above)**
    a. **Sensor Heads**
        i. Check that the inside of the heads are free from dust.
        ii. Check the internal voltages inside the sensor heads.
        iii. Check that the vortex cooling system.
        iv. Check that the fans are working.
        v. Check to ensure that the shutter mechanism is free and that the warning lights are operating correctly.
        vi. Check to ensure that the magnetic head separation switch is working and correctly prevents the shutter from operating if the heads are not together.
        vii. Check the sensors as suggested in the sensor manuals.
    b. **Scanner**
        i. Remove all of the covers from the beams.
        ii. Blow out all dust that may be on the beams.
        iii. Grease the linear bearing rails with high temperature grease (e.g. Lithium based grease).
        iv. Check the Power Track for any sign of damage and that it operates normally.
        v. Check the drive belt for signs of wear and that the tension is normal.
        vi. Check the seal belt for signs of wear and that the tension is normal.
        vii. Verify the correct operation of the clutch and blow out any dust that might have accumulated on the clutch plate.
        viii. Check the 5V and 24VDC supplies.
            1. The 5V should be <u>at least</u> 5.2V, normally 5.3V (no less than 5V actually on the computer board else operation will be unreliable),
            2. Check the small 24VDC regulated power supply inside the computer enclosure for 24V.
            3. Check the large 24VDC power supply which operates the clutch and heaters. The voltage

should be at least 24V. Note that a lower voltage might miss-operate the clutch.

4. **Quarterly Maintenance (in addition to the above monthly maintenance above)**
    a. Grease the drive belt bearing with a grease gun.
    b. Back up the flash memory and store in a safe place.
    c. Back up the SQCSExplorer software.
    d. Back up the MIS data base.
    e. Make screen prints of the important calibration and control tuning pages and back up.

CHAPTER 6

KEY SENSOR COMPONENTS

CHAPTER 5

5.0 KEY COMPONENTS

COMPONENT	MODEL	MANUFACTURER	COUNTRY OF ORIGIN
Linear Rail	40mm dia, tapped 500mm centres	Rextroth/ Wonshaft/ BaoLong	Germany/Korea/Taiwan
Linear Bearing Bushing	R0632 040 00	Rextroth	Germany
Motor -Gearbox	SEW	SEW	Germany
Clutch	Friction type, 24VDC	Ogura/ QianDai	Japan / Taiwan
Encoder	360ppr, quadrature encoder	Omron	Japan
Inverter	3G3JV	Omron	Japan
Single Board Computer	Littleboard AM-LB700-Q-12	AMPRO	USA
PC-104	DMM-32DX-AT	Diamond Systems	USA
I/O Pcbs	Digital I/O + ADC I/O + Tacho I/O	S-tec	China
Power Track Cable	Varies	TKD	Germany
Power Track	Varies	IGUS	Germany
Vortex Coolers	3215	EXAIR	USA
Scanner Frame & Mechanical Parts	Various	S-tec	China
DC Power Supplies	24VDC, 5VDC Switch Mode	MW	Taiwan